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JULY 1942

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"Keep It Flying"

VOL. XXXVII
No. 7

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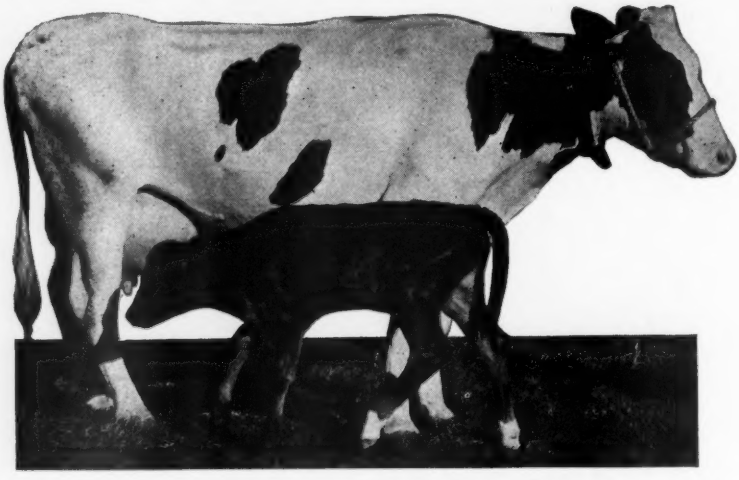
Clinical Use of Ascorbic Acid



THE CASE HISTORY — TREATMENT — RESULTS

This cow exhibited fourteen consecutive regular heat periods, and was bred ten times without conceiving. She was bred early and late — naturally and artificially — even several times during estrus, without conceiving. Finally, a Vitamin C determination made on her blood at the time of estrus revealed that the customary peak concentration of the vitamin did not occur. Accordingly, 2 grams of Ascorbic Acid were administered intravenously and 2 grams subcutaneously; the cow was bred immediately. The result of this treatment is seen in the above photograph.

Much credit is due Dr. Paul H. Phillips of the University of Wisconsin for proving that Ascorbic Acid therapy is often beneficial in causing conception among hard-to-settle and shy-breeding cows. Phillips' investigations have also shown the usefulness of Ascorbic Acid in improving the breeding efficiency of so-called slow-breeding bulls.

Recommended Dosage

For hard-to-settle and shy-breeding cows

2 grams administered subcutaneously and 2 grams given intravenously on the day of breeding. This dose schedule has been effective in 60-65 per cent of the cases studied. For cows that fail to respond, more intensive treatment consists of follow-up doses of 2 grams administered subcutaneously twice weekly for three weeks after breeding.

For Bulls—2 grams per 1000 pounds of body weight, administered subcutaneously twice weekly for three to six weeks as indicated.

Packages

50-c.c. vial (4 grams) **$0.90**
Sufficient for complete treatment of average cow.

250-c.c. vial (20 grams) **$3.60**
Bulk package—especially suitable for treatment of bulls.

Each 25 c.c. of Ascorbic Acid Solution contains 2 grams of Ascorbic Acid, which is equivalent to 40,000 International units of Vitamin C.

Write for Literature

JENSEN-SALSBERY LABORATORIES, INC.

KANSAS CITY, MISSOURI

VETERINARY MEDICINE

Registered in U. S. Patent Office

Leading Publication in the Veterinary Field for More Than Thirty Years

VOL. XXXVII JULY, 1942 No. 7

Aedes aegypti, the yellow fever mosquito, has been found in Jefferson City, Mo.; latitude about 38.6° north.

* * * *

As early as the first century of our era the horseshoe was being recommended by Pliny as a protective charm and even as a healing agent.

* * * *

It is not enough that one should "have the goods"—one must be able to "deliver the goods." This is the art of medicine, as contrasted with the science. It means knowing *how* to apply knowledge, and more important *when* to apply it.

* * * *

Army engineers have developed a portable steel overpass to aid troops and supply transport. It can be knocked down in sections and hauled on truck trailers. It takes less than three hours to reassemble.

Retardation of troops by steady streams of supply and troop traffic in the Louisiana maneuvers, disclosed the need of such an overpass.

* * * *

Investigating the factor responsible for the immunity of newborn mice to tuberculosis, Bruno Gerstl and Robert M. Thomas of Yale University discovered that certain enzymes appeared to be the factor sought. When introduced into test tubes containing tuberculosis bacilli, the mouse enzymes broke up the fatty components of the bacilli. It is these drug-resistant fatty components which are believed to be responsible for the failure of attempts to kill the germ by drugs. The possibility is suggested that it may be feasible to develop a preparation from the enzymes which will have a lethal effect on the tubercle bacillus *in vivo*.

In India, under the Animal Anesthetic Act dehorning of cattle over one month of age must be accomplished under general anesthesia.

* * * *

Horse-drawn vehicles were seen in London within a month after war began, restrictions on such traffic having been removed at the time war was declared.

* * * *

The ills of the veterinary profession are to no small extent of its own making. The reprisals from which it has suffered are chargeable chiefly to those inside the breastworks.

* * * *

First aid students should be taught that "in case a tourniquet is applied for the control of arterial hemorrhage, it is wise to release the tourniquet for a few minutes at thirty minute intervals," *The Journal of the American Medical Association* for February 7 advises in answer to an inquiry. "If the extremity is packed in ice, this time interval can be safely extended to one hour," it adds.

* * * *

Because of his unique qualifications, the veterinarian occupies an important place in public health work. No other professional man possesses the needed qualifications for meat or milk inspection, since he alone is competent to determine the wholesomeness of these important foods at their source. Public health authorities must depend largely upon the veterinarian for the control of those diseases and parasitisms of man which he acquires from animals. Upon the veterinarian rests the responsibility for recognizing these diseases at their source and for the initiation of measures for controlling or removing the natural reservoir of these infections.

George W. Dunkin
1886-1942

Major George N. Dunkin, M.R.C.V.S., D.V.H., Director of the Agricultural Research Council Field Station at Compton, Berks, England, died March 21, 1942, at the age of 55 years. Major Dunkin had been engaged in research since soon after the close of World War I in which he served with distinction in the British army as Commanding Officer of the 20th Veterinary Hospital, B.E.F.

However, it was in connection with the canine distemper investigation at Mill Hill and the development of the Laidlaw-Dunkin vaccine for the prevention of the disease that he was chiefly known in the United States, which he visited in 1931 and in which he had many friends among veterinarians.

* * * *

The production of penicillin[1] is one of the projects being carried on in the regional agricultural research laboratories, established as part of the AAA plan, reports Dr. Henry G. Knight, chief of the Bureau of Agricultural Chemistry and Engineering of the U. S. Department of Agriculture. The laboratories have also discovered a type of tobacco not now used commercially, which produces two to three times as much nicotine per acre as has been produced. It will be an important source of nicotinic acid (niacin[2]) as well as the nicotine for use in insecticides.

[1] *Vet. Med.* Feb., 1942, p. 57.
[2] *Ibid*, June, 1942, p. 232.

Assembling a New Collection

Early in the war the Pathologic and Anatomic Museum (London) was destroyed by German bombs. The Royal College of Surgeons had formed this invaluable collection after the last war and, among other things not to be found elsewhere, it contained plaster casts of every type of wound.

The War Office and the Royal College of Surgeons have secured the assistance of the Medical Research Council to aid in assembling a new comprehensive collection.

* * * *

Deficit Drugs

The war has rendered many districts from which the United States formerly imported plant drugs inaccessible, and lack of shipping has resulted in insufficient stock of others in the hands of drug manufacturers. Sponsored by the U. S. Department of Agriculture and several of the large drug firms, measures are being taken to produce in the Western Hemisphere many of the drugs the importation of which has been cut off.

Outstanding among drugs of which there is an acute shortage is quinine. The Cinchona tree is a native of South America but the world has long depended upon the East Indies for its supply of quinine. Many Cinchona plantations are being started in Central and South America with the prospect that in years to come the Western Hemisphere will become selfsufficient in this remedy for malaria.

Aconite, belladona, digitalis and henbane —all normally imported from Europe—will be produced in adequate quantities in the United States this season. Agar-agar, formerly obtained from China, is being gathered from seaweed fields off the coast of California. It is planned to produce papain in Cuba, fennel in Chile, cassia and aloes in the Dominican Republic, senna in Brazil, asafoetida in Peru and Psyllium and ergot in Urugay.

The cultivation of drug plants requires a small acreage but a large supply of low cost labor.

* * * *

★ ★ ★ BUY WAR SAVINGS STAMPS AND BONDS

O. C. D. Aids Civilian War Casualties

The U. S. Office of Civilian Defense will aid in the establishment of blood and plasma banks in hospitals of communities exposed to war hazards. This will be for the use of civilian casualties of war.

Funds are available for these projects through The U. S. Public Health Work. A technical handbook on the subject has been prepared by the National Research Council and will be distributed to hospitals by the OCD.

The recommendations included in this handibook for the preparation of blood and plasma banks, are to be observed in the hospitals accepting assistance from the OCD.

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Blood Transfusion Kits

Blood transfusion has been made readily accessible by a kit prepared by the American Red Cross. This package, about the size of a cigar box, contains two tins in one of which is the yellowish blood plasma powder (equal to one pint of whole blood) and in the other pyrogen-free sterile water. Included is a rubber tube, with needle, both sealed in an atmosphere of nitrogen. It takes about 15 minutes to mix and give the transfusion. Since the corpuscles have been removed, there is no need for typing.

Shortly after we entered the war blood donors at the 16 important centers increased enormously—in Washington 600%. The blood is collected and sent to processing laboratories where the corpuscles are separated by means of a centrifuge. The fluid is reduced to a powder by freezing and then removing the water vapor by vacuum pump. This dried plasma can be stored for five years without loss of effectiveness.

In certain cases of incendiary bomb burns and crush injuries (where there is little blood loss) transfusions made from dried plasma are best, but for anemia and infections whole blood is better, because of the iron in the red corpuscles and the germ-killing white cells.

Within six months the Army and Navy expect to have 200,000 of these kits in the field ready for use.

Niacin Deficiency

Psychic disturbances of various patterns are common in all types of nicotinic acid deficiency. The grade and nature of symptoms and signs of this deficiency are determined by the severity and duration of avitaminosis.

All known manifestations of deficiency of nicotinic acid are cured rapidly and usually completely by adequate specific therapy. It is not possible to predict the amounts of the vitamin necessary for cure or maintenance in every instance, but the normal requirement is about 25mg daily and some patients with mild endemic pellagra can be cured, though slowly, with this amount.

The amount of nicotinic acid required for maintenance is exceedingly variable and depends on the absorptive capacity of the gastric and intestinal mucosa and the functional integrity of the liver.—*Arch Int. Med.*

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Yellow Fever Vaccine Widely Used

Over 4,000,000 doses of yellow fever vaccine, nearly half of them furnished to the U. S. Army and Navy, have been prepared, without charge, by the International Health Division of The Rockefeller Foundation. More than 1,500,000 doses went to a strategically important area in East Africa. A subcutaneous injection of 0.5cc of diluted yellow fever vaccine is used for immunization.

Early in 1941 an order was issued by the War Department directing the Surgeon General of the Army to vaccinate against yellow fever soldiers stationed in tropical areas of the Western Hemisphere, including Panama and Puerto Rico. Since that time all soldiers sent to tropical countries have been similarly immunized.

Quite recently the War Department extended the order to the entire Army, thus making all military personnel available at any time for service in areas where the disease exists. A subcutaneous injection of 0.5cc of diluted yellow fever vaccine prepared by the International Health Division of the Rockefeller Foundation, is used.

★ ★ ★ BUY WAR SAVINGS STAMPS AND BONDS

pH—What Is It?

"pH" is an arbitrary symbol used by the chemist to denote a factor that affects practically every chemical reaction where water and acids, alkalis, or salts are present. pH may be a determining factor in such things as the completeness of precipitation in an analytical procedure, the dyeing of a fabric, the yield of a chemical process, the quality of a product made by a chemical process, the efficiency with which a chemical product serves the purpose intended, the rate at which bacteria grow, etc.

pH is defined in *Handbook of Chemistry and Physics* as "the logarithm of the reciprocal of the gram ionic hydrogen equivalents per liter." In simpler language, the pH is an indication of the degree of acidity or alkalinity of a solution. pH values do *not* indicate the *amount* of acid or alkali present—a solution may have a large amount of some acids, for example, boric acid, yet show a pH value much nearer the neutral point than a solution having only a trace of strong acid like hydrochloric. The *amount* of acid or alkali present is determined by titration. The *intensity* with which the acid or alkali will react, irrespective of the amount present, is indicated by the pH value.

The pH scale extends from 1 to 14. pH 7 is the "neutral" or transition point. Below 7 the values are increasingly acid; above 7 increasingly alkaline. The scale is logarithmic, therefore each unit indicates 10 times the hydrogen ion concentration of the preceding unit. Thus pH 5 is 10 times and pH 4 is 100 times as strongly acid as pH 6; likewise pH 9 is 10 times and pH 10 is 100 times as strongly alkaline as pH 8.

A *buffer* is a substance, usually containing a salt, that shows resistance to a change of pH on the addition of an acid or alkali. For example, one drop of hydrochloric acid added to a liter of distilled water makes a solution having a low (strongly acid) pH value because the solution is not buffered. But if the drop of hydrochloric acid is added to a liter of water in which are already dissolved substances such as borates, citrates, phosphates or other salts, then, because of the buffering action of these substances, the addition of the hydrochloric makes only a slight shift of pH toward the acid side. Since a buffer is a solution having a rather stable pH value, the term "buffer" is also commonly applied to solutions of known pH.—*R. R. Cargille.*

California Veterinarian Appointed to Red Cross Medical Committee

Karl F. Meyer, professor of bacteriology at the University of California and director of the Hooper Foundation for Medical Research, was appointed to the Medical and Health Advisory Committee of the American Red Cross, May 18th.

Dr. Meyer's advice will be especially valuable to the Red Cross in the analysis of problems arising in the Pacific Area.

The growth of the fur farming industry was contemporary with the development of artificial refrigeration. This was no mere coincidence. The storage of various meat products in a fresh and wholesome condition for periods of weeks and months is vital to domestic fur farming; without this aid fur ranching could not have been developed to its present size. Refrigeration engineering paved the way for growth and expansion of fur farming.—*American Nat'l Fur and Market Jnl.*

Leprosy in the United States

The origin of leprosy is lost in antiquity, yet until very recently it has been one of the most misunderstood and most dreaded of diseases. The National Leprosarium, Carville, Lousiana, is the finest institution for the segregation of lepers in the world. It contains all the known active cases of the disease in the United States, yet the inmates have never numbered 400. The yearly admissions to the institution number about 40, of whom four-fifths come from Louisiana, California and Texas. The disease is but slightly contagious and cases of infection in other than the three states mentioned, and Florida, are rare—almost non-existent. A large majority of the patients from these states are among immigrants, from Mexico or the West Indies, or their immediate families.

Photo by U. S. Signal Corps

DOG SLEDGES TRANSPORT WOUNDED IN RUSSIA

Dogs are being extensively used by the Russian Army to carry wounded soldiers to the rear. Large dogs are used for this purpose. Few of the dogs are wounded while performing this duty, according to reports from the Russian Army Veterinary Hospitals. During 1918 the French army in the Vosges Mountains used more than 8,000 sledge dogs. The U. S. Infantry in Alaska also makes use of dog sledges

The Red Cross has sent to China more than two tons of cyanogas in powder form which will be used for poisoning the rats and fleas that are spreading Bubonic plague.

The cattle population of India numbers 625,000,000 or one-third that of the whole world and nearly four times that of the United States. Cattle in India are the source of animal labor, milk, fuel, hides and even fertilizer for the soil on which the great bulk of the people of India depend directly for a livelihood.

Vitamin B_1 Shipped to Chinese

Dr. Christian Eijkman, the Dutch scientist, who shared the Nobel prize in 1929, noticed that the chickens in Java which were fed polished rice exclusively acted as though they had beriberi. He discovered that when the rice hulls were thrown into the chicken yard along with the rice the chickens got well. Adding B_1 found in the roughage of grains was found to bring relief to humans, too. Beriberi is still common in the Orient.

A short time ago 100,000 synthetic vitamin B_1 capsules were shipped for use in Chinese hospitals for treatment of the disease.

In Britain horses are becoming so difficult to obtain that veterans of the last war are being pressed into service. One old Welsh mare, now being used, was a colt at the time of the Boer War—40 years ago.

The common rat flea, abundant in the Hawaiian Islands, has been found capable of spreading endemic typhus fever. This is a much milder disease than the European typhus fever dreaded as a plague in war time. This flea is commonly found on rats, dogs, cats, mongooses and chickens in Hawaii. In Honolulu, during an experiment, these fleas were found on 13 percent of rats trapped.

The late Sir John M'Fadyean was first in England to investigate glanders bacteriologically. This was in 1892, at which time he used the Mallein test for diagnosis. In 1896 he wrote of the agglutination test, of which he was the originator, and advocated its use to stamp out the disease. Through application of these measures through the intervening years before World War I began in 1914, glanders had been completely eradicated from England.

"Sales to Graduate Veterinarians Only" Under Fire

The investigation of the marketing of veterinary supplies by the anti-trust division of the U. S. Department of Justice, which has been in progress for approximately one year, culminated May 28 in the indictment of 15 of the principal manufacturers and distributors of veterinary biological products whose sales policy includes limiting sales to graduate veterinarians.

In commenting on the indictment an official of the anti-trust division of the Department of Justice said: "It is an easy matter for any farm hand to vaccinate an animal. This monopoly is requiring farmers to spend thousands of unnecessary dollars. The veterinarian should confine his activities to diagnosis and the treatment of sick animals."

That statement may be good law, but it envisions poor policy. According to press reports the indictments charge violation of the anti-trust laws "by conspiring to restrict the sales of medicines to graduate veterinarians," and recites that "farmers, stockmen and poultry raisers are unable to obtain the vaccines by which animals are immunized against hog cholera, blackleg and fowl pox. Instead they must pay a veterinarian to do the job they could easily do themselves."

A generation of experience has shown that farmers spread more cholera than they prevent by vaccination. A shorter period has easily demonstrated that the use of fowl pox vaccine is not unaccompanied by hazard and certainly no stockman with the price has been unable to secure blackleg vaccine. However the case is to be tried in the courts—not in the pages of veterinary periodicals. While it is pending, ethics restrict discussion of its merits. Unquestionably the veterinary side of the controversy, and it is the livestock owners' side also, will be presented adequately.

The companies against which indictments were returned are:

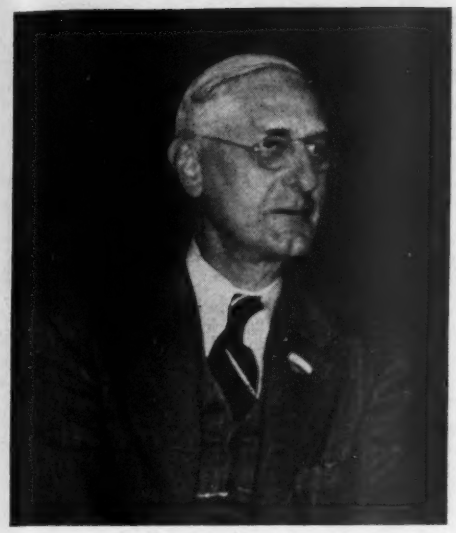
Associated Serum Producers, Inc., Wilmington, Del.; Allied Laboratories, Inc., Kansas City, Mo.; Blue Cross Norden Serum Company, Superior, Neb.; Columbus Serum Company, Columbus, O.; Corn Belt Laboratories, Inc., East St. Louis, Ill.; Corn Belt Serum Company, East St. Louis, Ill.; Corn States Serum Company, Omaha, Neb.; Fort Dodge Laboratories, Inc., Fort Dodge, Ia.; Grain Belt Supply Company, Omaha, Neb.; Jensen-Salsbery Laboratories, Inc., Kansas City, Mo.; Liberty Laboratories, Inc., Ralston, Neb.; Missouri Valley Serum Company, Kansas City, Kans.; National Laboratories Corporation, Kansas City, Kans.; Norden Laboratories, Lincoln, Neb.; Southwestern Serum Company, Wichita, Kans.; and the Gregory Laboratories, White Hall, Ill.

Indictments were returned against one or two officers of each company also—in all against 21 individuals.

Strong in the conviction that they have violated no law the companies involved refuse to alter their sales policy. Each will continue to distribute its products to veterinarians exclusively. None of these companies will change its policy in this respect unless and until forced to do so by an adverse decision of the court.

The findings of the court will, of course, be binding as to policy upon all firms engaged in veterinary supply, whether or not they were named in the indictment. Hence it is the fundamental policy of limiting the distribution of potent pharmaceutical and biological products to those who are qualified to use them, that is under adjudication. If this wise and necessary policy is held to be lawful it will be firmly established. If found in contravention of the anti-monopoly statutes, other means of protecting the livestock industry from the folly of some of those engaged in it will have to be found. Fortunately statutes already enacted by the Congress lodge large discretionary authority in this field in the Secretary of the U. S. Department of Agriculture.

Further, the Congress can of course remedy the situation by specific legislation. At a time when the livestock sanitary officials of several states are concerned as never before about the possible outbreaks of exotic animal plagues, it seems unlikely that the view that "The veterinarian should confine his activities to diagnosis and to the treatment of sick animals" could prevail if brought to the attention of the Congress.



President-elect W. W. Dimock

Army Veterinary Corps Completely Staffed

Major Sam F. Seeley, Executive Officer of the Procurement and Assignment Service, announces through the Veterinary State Chairmen as of May 7, 1942, that the veterinary service is now completely staffed and has a large reserve of officers which is adequate to meet the needs for the balance of the calendar year. So there are no vacancies in the Army Veterinary Corps.

It is also announced that the civil need of veterinarians is great and that it is desirable that they be not inducted into the military service as enlisted men.

To conserve all veterinarians in a professional capacity, the Surgeon General of the Army has ordered that any veterinarian who is inducted will receive a commission if he meets professional requirements. Those who have been drafted should apply immediately to the office of the Surgeon General for the necessary forms for application for a commission.

All bona fide matriculants in approved veterinary schools within the United States may now be commissioned in Medical Administrative Corps. This includes pre-veterinary students who are registered for incoming freshman classes.

American Veterinary Medical Association

79th Annual Meeting

August 17-20, 1942

Chicago

Headquarters, Stevens

For 26 years after it was organized all A.V.M.A. (then U.S.V.M.A.) meetings except one (Cincinnati, 1884) were held east of the Appalachian Mountains. In 1890 the annual meeting was held in Chicago. That was the first two-day meeting. All previous meetings had been one-day or more frequently one-afternoon meetings.

In 1893 the meeting was again held in Chicago. However at the time it was called an international veterinary congress. That was the year of the Chicago World's Fair and it was hoped as a consequence some European veterinarians might attend. In this the association was disappointed. The 1893 meeting was a 4-day meeting and set a new record for length just as the first Chicago meeting had done. It was 10 years before another 4-day meeting was held, and 16 years before another meeting was held in the Mid-West metropolis (1909). The fourth Chicago meeting was held in 1933, and as was the case 40 years earlier, a World's Fair (Century of Progress) was responsible for that city being chosen as the site of the meeting. Thus the meeting that will convene next August will be Chicago's fifth. Only Boston, New York and Philadelphia have been the meeting place of the association oftener than has Chicago.

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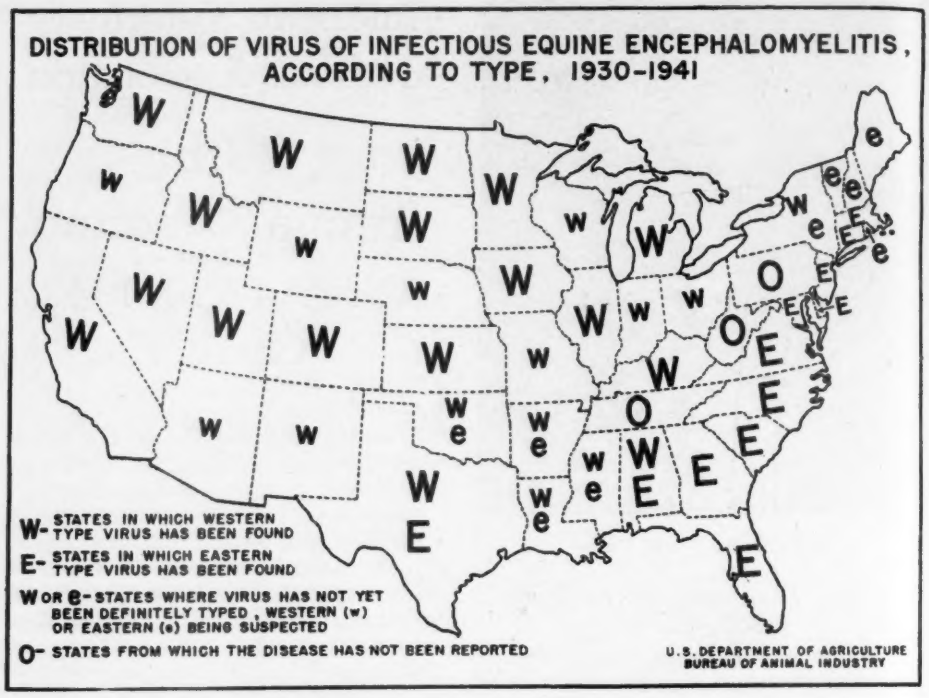
★ ★ ★ BUY WAR SAVINGS STAMPS AND BONDS

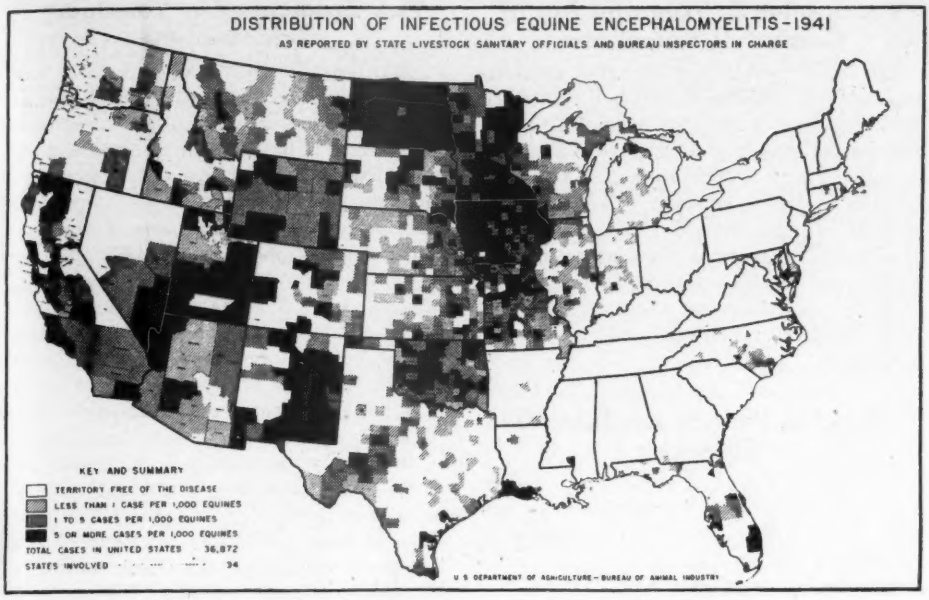

DISTRIBUTION OF VIRUS OF INFECTIOUS EQUINE ENCEPHALOMYELITIS, ACCORDING TO TYPE, 1930-1941
W- STATES IN WHICH WESTERN TYPE VIRUS HAS BEEN FOUND
E- STATES IN WHICH EASTERN TYPE VIRUS HAS BEEN FOUND
W OR e- STATES WHERE VIRUS HAS NOT YET BEEN DEFINITELY TYPED, WESTERN (w) OR EASTERN (e) BEING SUSPECTED
O- STATES FROM WHICH THE DISEASE HAS NOT BEEN REPORTED
U.S. DEPARTMENT OF AGRICULTURE BUREAU OF ANIMAL INDUSTRY

Distribution of infectious equine encephalomyelitis, according to type of virus

Infectious Encephalomyelitis in 1941

In 1941, 36,693 cases of infectious encephalomyelitis occurred in 40 states according to a report of Chief Mohler of the Federal Bureau of Animal Industry. This makes 1941 rank third in the annual number of cases since 1935 when the Bureau began keeping records of the incidence and mortality of this disease. The incidence reported for 1935 and the succeeding years, is approximately: 1935, 23,000 cases; 1936, 4,000; 1937, 176,000; 1938, 185,000; 1939, 9,800; 1940, 17,000 and 37,000 cases for 1941. More than 99% of the encephalomyelitis cases in 1941 were from the territory west of the Mississippi and Ohio Rivers. Ohio was the only State within that area that did not report the disease. The remaining 179 cases, less than 0.5% of the total for the country, occurred in eight States along the Atlantic Coast and in the South. The Bureau estimates that at least a million horses and mules have been affected with encephalomyelitis since Meyer, Haring and Howitt discovered the causative virus in 1930, although only 447,813 cases have been reported since then.

Missouri (8,671), Minnesota (6,777) and Iowa (5,963) led in the number of cases and Louisiana (31), Mississippi (17) and Missouri (14) led in the number of cases per thousand horses and mules. Nevada (40%), Illinois (37%) and Utah (35%) experienced the highest case mortality from the western type. The mortality from the Eastern type of the disease ranged from 89 to 100%, but a total of only 179 cases of that type occurred. The average case mortality for the whole country was 28%, which is higher than in recent years, possibly explained by a preponderance of young horses being affected. This higher mortality was predicted


DISTRIBUTION OF INFECTIOUS EQUINE ENCEPHALOMYELITIS-1941
AS REPORTED BY STATE LIVESTOCK SANITARY OFFICIALS AND BUREAU INSPECTORS IN CHARGE
KEY AND SUMMARY
TERRITORY FREE OF THE DISEASE
LESS THAN 1 CASE PER 1,000 EQUINES
1 TO 5 CASES PER 1,000 EQUINES
5 OR MORE CASES PER 1,000 EQUINES
TOTAL CASES IN UNITED STATES 36,872
STATES INVOLVED 34
U S DEPARTMENT OF AGRICULTURE—BUREAU OF ANIMAL INDUSTRY

Distribution and degree of incidence of infectious equine encephalomyelitis, 1941

in these pages as early as mid-August.[1]

In addition to the 12 states in which the Eastern type of encephalomyelitis is known to have occurred it is suspected of having occurred in nine states, Mississippi, Louisiana, Arkansas, Oklahoma, Maine, New Hampshire, Vermont, Rhode Island and New York. Both types have been identified in Alabama and Texas. The disease has not been reported from Tennessee, West Virginia or Pennsylvania. The western type virus has been identified in 17 states and is suspected of having occurred in 13 other states.

Reports show that 461,981 animals were vaccinated against equine encephalomyelitis with formolized chick embryo vaccine in 1941. This accounts for considerably less than half the vaccine probably used. The most desirable procedure is to vaccinate a month or more before the disease usually appears in the locality.

Cases of encephalomyelitis were reported in 213 vaccinated horses. The incidence was more than 13 times as high in nonvaccinated animals as it was in those that were vaccinated. However, the value of vaccination cannot be evaluated on that basis since a considerable amount of vaccination was done by the owners of the animals and other lay vaccinators. By such, the vaccine is commonly injected subcutaneously instead of intradermally and other irregularities of technic are committed.

The most significant development of the year was an outbreak of human encephalitis due to the same virus that causes encephalomyelitis in horses. A few such cases have been reported previously but in 1941, more than 2000 cases with 500 deaths occurred in a region extending from Colorado to Manitoba—a thousand cases occurring in North Dakota alone. Thus infectious encephalomyelitis moves into the position of first importance among the infections communicable from animals to man.

Naturally infected cases of encephalomyelitis have been demonstrated in the pheasant, deer and man as well as in horses and a large number of species are susceptible to artificial inoculation. Equine as a part of the name may well be dropped.

[1] Encephalomyelitis in 1941. *Veterinary Medicine* 36:9, p. 444.

Vaccination Is Valuable Aid in Control of Brucellosis

The experimental field studies of vaccination against brucellosis in cattle conducted by the federal Bureau of Animal Industry and cooperating states showed that 96.7% of calvings by 13,888 animals, previously vaccinated when between four and eight months of age, were normal. Blood tests also have indicated a high degree of resistance of vaccinated animals to infection with the disease, when they were exposed by contact with infected cattle.—*John R. Mohler.*

Needed Service for Britain's Livestock

If I were to hazard a guess at the annual loss due to disease among our 40 million head of livestock and millions of poultry, I should place the figure at a minimum of £50,000,000.

Much of this loss could be avoided if veterinary advice and methods were made readily available to herd owners either at the outset of the disease or preferably at a time when preventive measures can best be adopted.—*W. R. Wooldridge, Pres. Nat'l Vet. Med. Assn. of Great Britain and Ireland.*

Cattle in 76 Additional Counties Practically Freed of Brucellosis

Seventy-six counties in 19 states have been added to the list of modified accredited Brucellosis-free areas. These 76 counties contain approximately 735,000 dairy and breeding cattle 6 months of age or older. With this latest addition the "modified" area now includes a total of 522 counties in 24 states, reports the U. S. Department of Agriculture. North Carolina added 21, Georgia 12, and Arkansas 7 new counties to the list.

The cooperative testing of cattle under the area plan is being conducted in 181 additional counties in 25 states. Vaccinating calves against the disease is likewise being extensively practiced as a control measure. Since January 1, 1941, approximately 108,000 calves between the ages of four and eight months have been vaccinated.

Tick Eradication a Veterinary Achievement

Following the Civil War, tick fever was levying a terrible toll on the cattle industry in 15 states, and waves of it were spreading north to Nebraska, Illinois and Pennsylvania. The federal government took a hand and some years later established quarantine that protected the northern states and helped matters in the South. By 1906 the cattle industry of the South was facing ruin and a systematic eradication of the fever tick was undertaken by the veterinary service, but to a considerable extent under political control. The latter caused delay, multiplied the cost a dozen times and was responsible for most of the opposition of cattle owners; but viewed from results, the whole project has been a glorious achievement of enormous economic value. The fever tick has been driven to a few border counties in Texas and a few Florida swamps. Its complete eradication from the continental United States is a matter of a few years.

Mineral-Deficiency Studies

Third-year results of the study being conducted by the Bureau of Animal Industry in cooperation with the Texas Agricultural Experiment Station and the King Ranch near Falfurrias, Texas, well illustrate the heavy toll taken of the livestock industry by mineral-deficient range and pastures. In this work three groups of cows grazing phosphorus-deficient range were individually fed definite quantities of phosphorus from various sources and a fourth group, receiving no phosphorus supplement, was used as a check. This past year the calf crop from the cows receiving phosphorus was 77% as compared to 41% for the control group, resulting in the production of 378 pounds of weaned calf per cow for the supplement-fed groups and but 176 pounds for the control cows. Calves from the cows fed phosphorus supplement weighed approximately 65 pounds more at weaning and about 100 pounds more at one year of age than did those from the control cows. During two consecutive years, 76% of the supplement-fed cows and 23% of the controls produced a calf each year.

Functions of the Army Veterinary Service

THE veterinary service of the United States Army during the War Between the States was supplied by a personnel selected from the troops. Men with special aptitude but without scientific training were chosen to treat the ailments of government animals. They were given the rank of sergeant major. The result of this policy was a great disappointment and entailed much criticism, both in and out of the Army. In 1863, owing principally to disease among the animals, the Army in West Tennessee required 150 horses and the Army of the Potomac 500 daily for replacements. The most unfortunate result of this unscientific policy of using untrained personnel for disease control was the spread of disease among animals of the civilian population by the sale of unfit horses. Glanders was a rare disease in this country until after the Civil War, but diseased horses sold by the Army during and following the Civil War spread it to every county and city east of the Mississippi River, and it was not brought under control until the end of the century—more than a generation later. In the meantime the cost of this disease to farmers and owners of horses in cities mounted to hundreds of millions of dollars.

Following this disastrous experience, the Army veterinary service was reorganized (in 1868), and provisions made that only graduates of veterinary colleges could be appointed to the position of Army veterinarian. This brought about an improvement in the service, but it was not until 1902, 34 years later, that the spirit of the regulation was carried out by appointing only graduates from recognized veterinary schools, and then only after an examination that eliminated the unfit.

The improvement of the Army veterinary service following the changes of 1902 was so marked that it was obviously but a matter

Brigadier General R. A. Kelser, Chief of the Veterinary Corps, Surgeon General's Office, War Department and other officers of the Veterinary Corps meet with officers of Wilson & Co., to discuss preparation of products for the Army. Left to right (seated): A. A. Dacey, Executive Department and Harry J. Williams, Vice President of Wilson & Co.; Brig. Gen. R. A. Kelser; Left to right (standing): Lt. Col. Fred C. Waters, Depot Veterinarian (Chicago Quartermaster Depot); Dr. H. E. Kingman and Dr. R. F. Vermilya of Wilson veterinary department; Lt. Col. Seth C. Dildine, Headquarters' Veterinarian of Quartermaster Perishable Subsistence Branch; Col. James E. Noonan, Corps Area Veterinarian; G. B. Thorne, Executive Department of Wilson's; Lt. Col. Louis L. Shook, Director of the U. S. Army School of Meat and Dairy Hygiene; Harold Graham, Superintendent's Staff, Wilson & Co.

FORGE ROOM HORSE SHOEING SCHOOL, FT. RILEY

The Army requires many horseshoers. All are trained in schools conducted by veterinary officers. Sometimes officers take the course. The first two forges at the right above are manned by captains (cav.).

of time until this service would be placed upon a strictly professional basis analogous to that of the medical service. This was done in 1916, when the veterinary service was, by act of the Congress, made a part of the Medical Department of the Army, and Army veterinarians were commissioned in grades from second lieutenant to major and during the World War to the grade of colonel and in the present war, by order of the president, to that of brigadier general.

The veterinary service as a part of the Medical Department of the U. S. Army is charged with a dual responsibility which falls under two general heads: the care and treatment of animals and the inspection of food supplies of animal origin for the Army personnel.

With reference to animals, the veterinary service is responsible for investigating the hygienic and sanitary conditions under which they are kept and for making suggestions and recommendations for their improvement and for increased efficiency. It instructs the military personnel in animal sanitation and management. The scope covered under animal management in general includes: feeds and feeding, watering, grooming, exercise and horseshoeing.

The subject of horseshoeing is especially stressed, since the Army must train its own horseshoers; the art and science of shoeing horses are fast becoming unknown in civil life. Three large horseshoeing schools are maintained for this purpose. They are located at Fort Riley, Kans.; Fort Sill, Okla., and Fort Bliss, Tex. Especially selected soldiers are sent to them for a five-month course. In addition, short courses are given at other stations where animals are kept. All of these schools are under the supervision of veterinary officers.

Another responsibility of the veterinary service is the physical examination of animals before purchase for the Army, and before condemnation as being of no further use in the military service.

The inspection of all hay and grain before purchase by the Quartermaster in the United States and our foreign possessions is another function of the veterinary service. As an indication of the magnitude of this service in peacetime, the records show that 191,410,886 pounds of forage was inspected during the fiscal year ending June 30th, 1940, and that of this amount 15,235,376 pounds were rejected as not meeting the specification requirements. This resulted in a large saving to the Government. Of course, the purchase of grain and hay are much greater now.

A further responsibility of the Army vet-

INSPECTION OF TURKEYS AT THE SCHOOL OF MEAT AND DAIRY HYGIENE, CHICAGO
Left to right: Lieuts. Myron Thom, Hugh D. Smith, Orlen L. Bailey (front view), J. B. Couch, and Ralph A. Maxwell

erinarian is the management of veterinary military hospitals and the personnel of all other veterinary units, also the training, instruction and assignment to duty of commissioned and enlisted personnel of the veterinary service.

The evacuation and care of sick and wounded animals; the institution of suitable protective measures to prevent the introduction of communicable diseases; and the prompt detection, proper handling, (including isolation and quarantine), and application of curative measures to affected animals and those suspected of disease, constitute another extremely important function of the Army veterinary service.

Placing the responsibility for the inspection of food for the Army personnel upon the veterinary service was a natural outgrowth of experiences with poor quality foods during the Spanish American War—particularly the embalmed beef scandal. When the Army set about developing a personnel to pass upon, and guarantee, the quality of its food, it was soon realized that its veterinary officers alone had the requisite scientific training in animal pathology to determine the healthfulness or otherwise of the animals from which its principal foods are derived and the wholesomeness of the meat and meat products, milk, butter, cheese, ice cream, eggs, fish, etc.

The Army recognizes and accepts the inspection service of the Bureau of Animal Industry insofar as it covers the ante- and postmortem examination, but charges the Army veterinary service with the inspection for class, type, quality, grade and sanitary conditions and, where B.A.I. inspected products are not available, with ante- and postmortem inspection of food animals and sanitary inspecting of food processing establishments. This inspection is a safeguard to the health of the soldiers and is of inestimable value to the military service.

Again referring to peacetime activities, it may be of interest to mention that during the fiscal year ending June 30th, 1940, the

Army veterinary service inspected, both before purchase and at the time of issue to the troops, a total of 421,820,575 pounds of such items as beef, pork, mutton, poultry, fish and dairy products. Of this amount 8,912,704 pounds were rejected as not conforming to the government specifications, resulting in a saving to the Government of $614,308.73. To be applicable at the present time, it is probable that all the foregoing figures should be multiplied by 20 because of the vast increase in the size of the Army since then. In addition to the Army, inspection was furnished for the U. S. Soldiers Home in Washington, the Veterans Administration, certain U. S. Naval stations, the National Guard, the Works Progress Administration, and the Civilian Conservation Corps.

■ Veterinary officers are assigned to duty at the Remount Stations at Front Royal, Va.; Fort Reno, Okla., and Fort Robinson, Neb. They perform the important duties of testing for sterility remount stallions and mares maintained at the remount, and those stallions placed among the civilian agents for breeding purposes in their respective areas. This includes 700 stallions at the present time. One hundred sixty-seven government-owned mares were bred at the three remount stations during 1940, resulting in 123 living foals, 30 days after birth. About 40% of the mares were artificially inseminated by the use of capsule or syringe.

Glanders has been practically eliminated from Army animals by the veterinary service due to the precautionary measures of mallein testing, hygiene and quarantine. Only three cases occurred during the calendar year 1939 out of a total of 23,432 animals; no cases among 50,000 animals in later tests.

At the remount station, Front Royal, Va., army veterinary service has, in addition to the usual station duties, the responsibility for supervising the breeding activities and research into diseases incident to reproduction

There were 185,000 cases of encephalomyelitis among the horses of the civilian population during the year 1938 and many cases each year since that time. All animals in the Army were vaccinated in 1939 and each year since with a vaccine prepared at the Army Veterinary Laboratory in Washington, with the result that not a single case has occurred among army animals in the past three years.

All horses and mules are protected annually against equine encephalomyelitis by the use of vaccine prepared at the Army Veterinary Laboratory in Washington, at a great saving to the Government. All government animals are given also tetanus toxoid, and such as are taken into districts where anthrax is enzootic are vaccinated against that disease.

Veterinary laboratory service is conducted at the Army Medical Center, Washington, D. C.; the Station Hospital, Fort Sam Houston, Texas; the General Depot, Fort Mason, California; the Research Laboratory for Animal Diseases, at Front Royal, Va., and at the Chicago Quartermaster Depot.

The following biological products were prepared during the year 1940 at the Army Veterinary Laboratory, Medical Center, Washington, D. C., for use in connection with army animals:

Antigen—Autogenous; equine infectious abortion	965cc
Bacterin—Autogenous; equine infectious abortion	6,615cc
Blood—Defibrinated; horse, sheep and rabbit	28,230cc
Mallein—Intradermic	91,905 doses
Mallein—Crude	4,715cc
Serum—Anti-strangles, equine infectious abortion, and normal horse	45,110cc
Tuberculin—Intradermic	14,120 doses
Tuberculin—Crude	650cc
Vaccine—Equine encephalomyelitis;	
Western type	579,309cc
Eastern type	358,199cc
Bivalent type	18,000cc

Veterinary Medicine and Military Prowess

By the beginning of the 18th century, food was the limiting factor in military power, and the nations bent on conquest or on repelling invasion, began to realize the necessity of developing a veterinary service to protect their food supply, in order to maintain their military strength. In 1762, France established the first veterinary school of modern times at Lyons, and, three years later, another at Alfort. In rapid succession every important country of Europe folowed the example of France. With the establishment of good veterinary services, the great devastating animal plagues of an earlier day were banished and famines, except as a result of war, ceased to occur in civilized countries.

Federal Inspection of Intrastate Meat

In continental U. S. the army buys only B.A.I. inspected meat. To broaden the source of the army's meat, save transportation and as a measure of relief for small packers, many of whom are standing at the wailing wall because of the price ceiling on meat, a bill has been introduced in the Congress to authorize the Secretary of Agriculture to institute meat inspection comparable to that supplied in packing plants doing an interstate business for intrastate plants.

Some years ago Chief Mohler estimated it would cost twice as much to inspect the one-third of the meat supply of the nation not then inspected as to inspect the two-thirds that went into interstate trade. The authorization is not mandatory upon the Secretary and it is thought probable he may provide intrastate inspection only for plants strategically located for the supply of army posts and whose facilities approximate those required by the federal meat inspection regulations now in force.

Commenting on this proposed extension of federal meat inspection Brigadier General Carl A. Hardigg, appearing for the army, stated at the congressional committee hearing: "Primarily we request that nothing be done to take away B.A.I. inspection of army meats. There is no objection to the measure so long as inspection continues under the B.A.I. Any delegation of authority to state or municipal inspectors will make additional inspection by the army necessary."

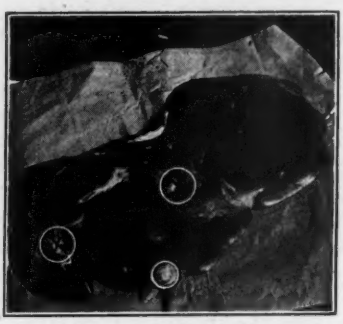
Animal Diseases Take Heavy Annual Toll in By-products

By G. B. THORNE*

A STUDY of utilization of animal by-products reveals that there is a tremendous loss because of disease or parasitic condition of the animals. We estimate that this loss, on an industrial basis, is now running in the neighborhood of $17,000,000 annually. While diseased conditions are of utmost importance, the losses caused by the parasites which infest our domestic animals constitute the major problem. This is indicated by the fact that over $6,000,000 is lost annually because of the destruction by parasites of animal casings.

Nodules in the walls of the small intestine of a mature ewe

This destruction is evidenced in several ways. For example, the nodular worm in sheep not only makes the intestine useless as a casing, but destroys its value in the manufacture of surgical sutures and tennis strings, and, of course, causes a heavy loss in flesh and quality of the animal. Likewise, round worms in hogs not only lower the value of the casings, but their presence in large numbers necessitates much longer feeding periods and more expensive gains on the part of the producers.



Half-tone courtesy H. R. Smith

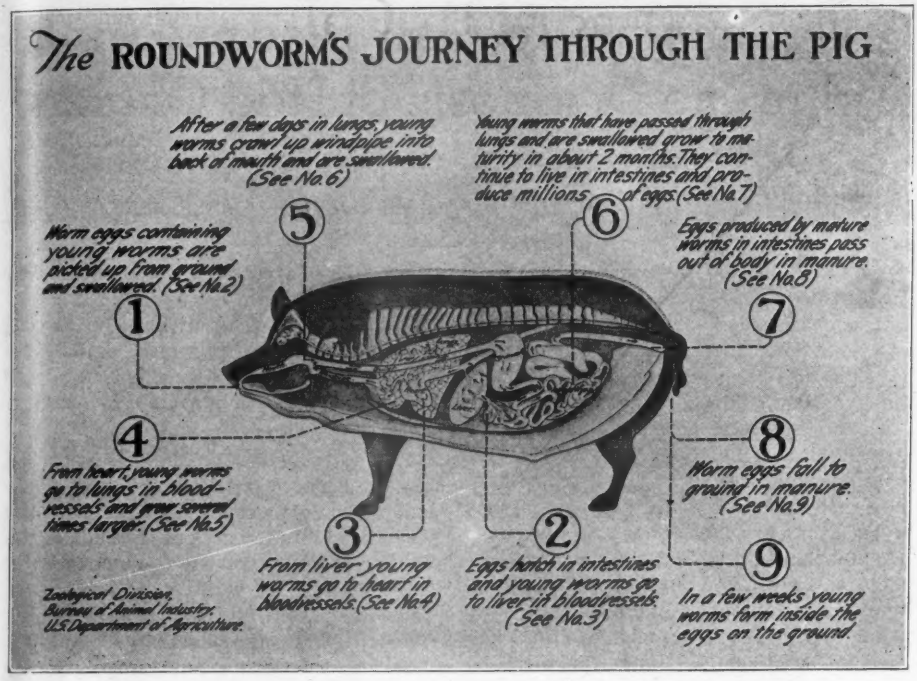
Of the 55,000,000 pounds of beef livers condemned by the B. A. I. from 1935 to 1940, two-thirds was due to abscesses. This condition (not parasitic) is the subject of much research. X's and the arrow indicate abscesses

The damage to hides caused by the ox warble grub amounts to approximately $2,500,000 annually. Incidentally, the damage to hides by grubs is only a small part of the annual loss which they cause. The presence of these parasites has a detrimental influence on the milk production of the dairy cow and on the growth and economic gains of cattle in the pasture and in the feedlot. Severe trimming of beef carcasses because of ox warble infestation is quite common. This trimming must be done on the most expensive cuts and causes heavy financial loss, not only because of the weight of the trimmed out portions, but also because of the degrading of the cuts made necessary.

Twelve years ago, the United States Department of Agriculture estimated that the annual loss from the ox warble grub was approximately $50,000,000.

Nearly all lungs of sheep and hogs are

* Agricultural Economist, Wilson & Company, Inc.


The ROUNDWORM'S JOURNEY THROUGH THE PIG
After a few days in lungs, young worms crawl up windpipe into back of mouth and are swallowed. (See No. 6)
Young worms that have passed through lungs and are swallowed grow to maturity in about 2 months. They continue to live in intestines and produce millions of eggs. (See No. 7)
Worm eggs containing young worms are picked up from ground and swallowed. (See No. 2)
Eggs produced by mature worms in intestines pass out of body in manure. (See No. 8)
From heart, young worms go to lungs in blood-vessels and grow several times larger. (See No. 5)
Worm eggs fall to ground in manure. (See No. 9)
From liver, young worms go to heart in bloodvessels. (See No. 4)
Eggs hatch in intestines and young worms go to liver in bloodvessels. (See No. 3)
In a few weeks young worms form inside the eggs on the ground.
Zoological Division, Bureau of Animal Industry, U.S. Department of Agriculture.

infested with parasites, which results in a loss of at least $2,500,000 under present-day conditions. Fortunately, beef lungs are relatively free from these parasites and by careful observation and packinghouse practices, only 5% are discarded. Even this results in a loss of approximately $300,000 annually.

For many years, large numbers of livers were discarded and no one was much concerned about the loss. However, since the discovery that liver is a valuable aid in the treatment of certain human ailments such as pernicious anemia, and the fact that livers are the highest known source of the vitamin B complex, the discarding of more than a million beef livers in 1940, amounting to a loss of over $2,000,000, is a very serious loss to the industry.

The loss of beef livers is not due to parasites, but rather to a diseased condition in the form of small abscesses, which makes the liver unfit for food. Considerable study is being given this problem to determine the basic cause of liver abscesses.

Two and one-half million hog livers and nearly two million lamb livers were likewise declared unfit for food in 1940. The extent of these losses is estimated at $2,300,000. Unlike the condition observed in beef livers, the cause of condemnation of hog and lamb livers is usually due to parasitic infestation.

In compiling these data, not all of the losses have been covered, but $17,000,000 appears to be a conservative estimate of the annual loss (based on present values) from damage to by-products.

It would appear that considerably more attention should be given to determining more accurately the extent of these losses, their causes and methods of prevention. Undoubtedly, there is a great opportunity for substantial benefits to the livestock producer to be derived from this work. Not only are there opportunities through expanded research in this field, but there is also an opportunity to increase returns to the livestock industry by improving the quality of by-product raw materials, through improvement of methods of production and marketing and greater efforts in disease and parasite control.—*The National Provisioner*, April 4, 1942.

Cell Changes in Gall Bladder As an Aid in the Diagnosis of Hog Cholera*

By WILLIAM H. BOYNTON,[1] D.V.M., GLADYS M. WOODS,[1] M.A., F. W. WOOD,[2] D.V.M., and N. H. CASSELBERRY,[2] D.V.M.

ALTHOUGH much progress has been made in connection with the immunological phase of hog cholera, as yet no laboratory method of diagnosis has been devised for this disease except the expensive and time-consuming method of filtration of material from a suspected case and subsequent inoculation of the filtrate into a pig—the only known species of animal susceptible to hog cholera. The costliness of this method in both time and money has forced the field veterinarian to depend for his diagnosis almost entirely upon history, clinical symptoms, and autopsy findings, with such laboratory aid as the seldom practicable leucocyte and lobular counts. The more experienced the veterinarian is in clinical diagnosis of cholera, the more he encounters difficulties due to the overlapping of symptoms and lesions of various hog disease entities. Any reliable diagnostic aid would, therefore, be of inestimable benefit, particularly in doubtful cases in which the advisability of immunization measures is open to question.

The finding of inclusion bodies in some other virus diseases suggested that similar bodies should be demonstrable in hog cholera. In fact, more than 30 years ago, Uhlenhuth and Böing[3, 4] claimed the presence of cell inclusions in the conjunctiva during the early stages of the disease; but inasmuch as these bodies have been reported in healthy animals, they are considered of no diagnostic significance today. For this study, the gall bladder, which is affected in this disease but heretofore has received scant attention from workers on hog cholera, was selected as tissue in which pathological changes might be distinguishable. The technic of securing the preparations from this tissue is as follows:

The gall bladder is dissected from the liver and placed on a firm surface. An incision is made extending along its entire length and into the neck of the bladder. The bile is removed and the mucous surface then carefully swabbed with cotton two or three times to get rid of the greater portion of bile adhering to the bladder wall. Scrapings of the mucous membrane are taken from the neck and upper fourth of the gall bladder, since it is in this area that the true mucoid glands are found. A thin smear of these scrapings is made on a clean glass slide. This is allowed to dry in air and is then fixed in methyl alcohol for 15 minutes, and again allowed to dry in air. To stain, eosin-methylene blue or any of the polychrome methods such as Wright's, Leishman's, Jenner's, or Giemsa's method may be used. However, the most dependable results and the most clear-cut differentiations have been obtained with Kingsley's[5] stain. In this method, the fixed preparation is flooded with stain which is allowed to act for seven minutes. The stained smear is then washed thoroughly with distilled water and, after being air dried, is ready for microscopic examination.

A total of more than 600 smears of gall bladder scrapings from field and laboratory cases have been examined so far. In addition, some 50 preparations have been studied from apparently healthy swine brought to slaughter, from laboratory and field cases

*Presented at the 60th Annual Meeting of the Illinois State Veterinary Medical Association, Springfield, Jan. 22-23, 1942.

[1] Division of Veterinary Science, University of California, Berkeley, California.

[2] Cutter Laboratories, Berkeley, California.

[3] Gay and Associates, 1935. *Agents of Disease and Host Resistance* (Charles C. Thomas, Springfield, Ill., and Baltimore, Md.), p. 1206.

[4] Hutyra, Marek and Manninger, 1938. *Special Pathology and Therapeutics of the Diseases of Domestic Animals* (Alexander Eger, Chicago, 4th ed.), Vol. I, p. 287.

[5] Kingsley, Daniel M., 1937. Acetone solvents for Romanowsky stains. *Jnl. Lab. and Clin. Med.* 22:5, p. 524.

affected with severe pneumonia of both suiseptica and suipestifer types, from pigs suffering from enteritis and verminous infestations, and from one case diagnosed as erysipelas.

In all these non-cholera cases, the glandular and epithelial cells failed to take the stain readily. The nuclei in many instances showed a slight network of chromatin

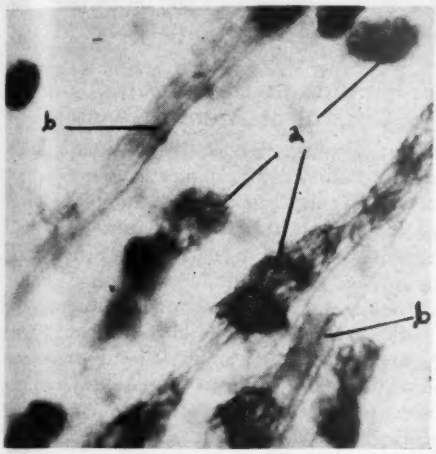


Fig. 1. Normal pig: (a) Meshlike, mucoid cells; (b) Stringy, mucoid material

with stringy, mucoid-appearing substance throughout the preparation. The more deeply stained nuclei among these cases were filled with this stringy, mucoid-like material.

In cholera cases, on the other hand, the nuclei of both the glandular and epithelial cells stained very sharply and distinctly. Inclusion bodies were observed in the nuclei of many of the glandular cells. These bodies stained a deep magenta and were easily differentiated from the nucleoli, which stained a light blue. The stringy mucoid-like substance was absent in preparations from more advanced cases and was apparently replaced by a granular, reddish-purple precipitate. In general, preparations from cholera-infected pigs destroyed on the sixth day after virus inoculation showed less clear-cut results than those from pigs destroyed on the seventh day, or from the usual field cases. Likewise, experimental pigs subjected to a more reduced ration for two days preceding their destruction on the sixth day, showed less distinctly stained cells.

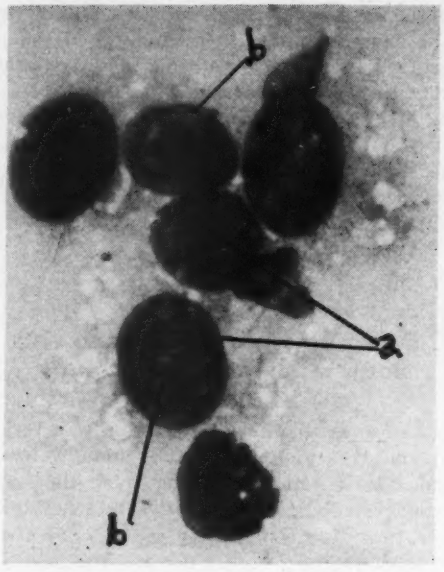


Fig. 2. Cholera-infected pig: (a) So-called inclusion bodies in the deep-staining mucoid cells; (b) Nucleoli

To substantiate the finding of inclusion bodies, a few smears were stained with aqueous nigrosine. Dark staining bodies were observed in some of the nuclei and in the cell body as well. Since the bodies were less prevalent in smears stained by nigrosine, this suggested that the bodies stained by Kingsley's method may not all be of the same substance; that is, some of the bodies may, perhaps, be composed of coagulated mucoid-like material.

Whether or not these bodies are true inclusion bodies in the same sense as the bodies found in other virus diseases, is not known. Nor is it understood why the glandular and epithelial cells of the gall bladder in cholera-infested animals stain so sharply and uniformly in contrast to those from non-cholera cases, and why, in the more advanced stages of cholera particularly, the mucoid-like substance is replaced by a granular precipitate. The explanation for these apparent differences in affinity for stain and the changed appearance of the entire background in the smears might possibly be based on some chemical change which may

occur in the bile of cholera cases. Whatever the explanation for these findings may be, and whether or not the bodies observed are true inclusion bodies, upon the basis of the studies so far it appears that a manifestly different and easily discernible microscopic picture can be obtained from the gall bladder scrapings of cholera-infected pigs. This suggests a possible aid in confirming the diagnosis of cholera.

* * * *

Clinical Veterinary Medicine Lags Behind Scientific Veterinary Progress

Veterinarians have shared in the very human trait of procrastination. Many veterinarians still in practice remember the announcement of the discovery of Schmidt's treatment for milk fever in 1896. At the Omaha meeting of the A.V.M.A. in 1898 it was fully described, but not till 1908 was it anything like generally used. In the intervening decade, between the discovery and its first use except by a few venturesome souls in this country, farmers and dairymen suffered an incalculable loss because, in this matter, the majority of American veterinarians had been left far behind in the march of progress. The gap between the science and the art of veterinary medicine in the matter of the treatment of milk fever is not unique. In undertaking the eradication of Texas fever, application lagged 16 years behind the knowledge of how to do it; in tuberculosis the delay was 23 years; and in bovine brucellosis 40 years. Numerous less conspicuous examples can be cited. Few veterinarians have made the change from equine to dairy or swine or small animal practice voluntarily.

This natural tendency to "stand pat" because it is the easiest thing to do, should ever be guarded against. To give in to it means to become a back number promptly. This does not mean that we should chase after new gods, true or false, but rather that we should keep an open mind, accept that which is proved, and consider that which is probable. An old couplet says: "Be not the first by whom the new is tried, nor the last to lay the old aside."

Veterinary Vital Statistics Must Precede Intelligent Disease Control

It is axiomatic that one cannot put out a fire until one knows where it is. It is certainly true of disease that one cannot do much about it without knowing where it is, how it got there, how much of it there is and where it is going. We cannot know these things until we accumulate some dependable animal disease statistics.

* * * *

Population Dependent Upon Control of Animal Disease

Civilized man cannot live without his domestic animals. The domestic animals possessed by any nation and those available to it through trade set an absolute limit upon its population. Disregarding the sparse primitive tribes who subsist upon game, throughout history the population of the world has been just as large as could feed upon its domestic animals. So far as we can ascertain, many ancient peoples had a somewhat effective service for the control of animal diseases, but it sank into oblivion along with human medicine and all other science soon after the beginning of the Christian era; and throughout the dark ages in Europe and afterward (altogether over a period of 1500 years) uncontrolled animal plagues ravished the herds and flocks of the whole continent, leaving famine and pestilence in their wake, just as they would today but for our veterinary service.

The loss of property and the interference with production prevented the accumulation of wealth, as we now know it, or improvement of the standard of living; the recurrent famines and pestilences prevented an increase in population or the progress of civilization. Socially and numerically, man was at a standstill because of the precarious and often inadequate food supply, even for a starvation level of existence. The condition was not improved and could not be remedied until the great animal plagues were brought under control. This could not be effected without a skilled veterinary service. Disease is too complex for inexpert handling, too resourceful for the untrained and unscientific.

Preparation of Specimens for Histologic Diagnosis

By FRANK BLOOM
Flushing, New York

FOR the last seven years the writer has conducted a pathological laboratory to which numerous veterinarians have sent tissue specimens for microscopic diagnosis. This material falls into two classes: (1) surgical specimens (neoplasms and other biopsy material), and (2) tissues and organs from necropsy examinations.

With biopsy material, an immediate diagnosis is usually required. This can be accomplished within 10 minutes with the frozen section method or in 24 hours with the rapid paraffin method.. A report on necropsy material can also be rendered in 24 hours, although the slow paraffin method requiring four to five days is more advisable, as there is better dehydration and infiltration of the tissues. Furthermore, except for occasional instances, there is rarely any necessity for immediate reports on the latter material.

It is perhaps superfluous to stress the importance and, in many cases, the necessity of histopathologic examinations. In surgical specimens the correct diagnosis often can be arrived at only by microscopic study. In addition, the client is gratified by the knowledge that modern scientific methods are being used in the care of his animal.

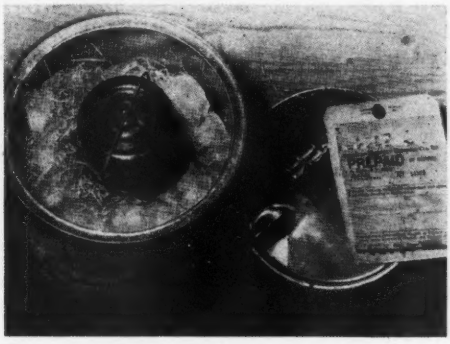
For adequate microscopic examination it is imperative that the tissue be properly prepared. This includes several important factors that the veterinarian should be cognizant of before submitting the specimen to the laboratory. The success of the technical procedures in the laboratory depends largely on the previous preparation of the specimen by the clinician.

■ The common faults encountered in tissues sent for microscopic diagnosis can be classified as follows:

1. The use of rubbing alcohol and full-strength formaldehyde solution for the fixatives. In an emergency these fluids may be used, but in general they are inferior.

2. Traumatization or distortion of the tissues.

3. Changes in the specimen characteristic of postmortem autolysis, indicating, with surgical material, that fixation has been delayed; and with necropsy material, that the postmortem examination has not been immediate or that the cadaver has not been refrigerated.



Excellent for shipment of tissues.—*Baker and Klussendorf—Cor. Vet.*

4. Sending sections not representative of the total pathological changes present. Rarely, a specimen is received that is microscopically normal, indicating that the pathologic lesion has been missed.

5. Literally stuffing large tumors, organs, or parts of organs into small jars or bottles and covering them with inadequate amounts of fixing fluid. This is the commonest fault. As practically all fixatives have a hardening action, it is often impossible to remove the specimen without breaking the container. In addition, the volume of fixing fluid is inadequate, and consequently only superficial portions of the specimen are fixed, the central portion usually showing autolysis.

■ To prevent improper methods of tissue preparation, the following practical recommendations for the clinician are offered. Specimens to be submitted to a laboratory prepared as here described should be in good condition for histologic examination.

Numerous fixing agents have been devised for staining methods and various other uses. For practical purposes, only formaldehyde need be considered. It has its disadvantages, but it is best adapted to the routine fixation of tissues. Formaldehyde solution (formalin) is a 37% solution of the gas formaldehyde in water. The best strength to use for general fixation is a 10% solution of formalin, prepared by mixing 10 parts of the 37% aqueous formaldehyde solution with 90 parts of tap water. For convenience, a gallon or more can be made up at one time. Tissues can be preserved indefinitely in this solution, and no further treatment is required. In the 37% stock solution there is a gradual development of formic acid, which may exert an injurious effect on tissues preserved in it. This acidity can be neutralized by adding one to two ounces of calcium carbonate, marble chips, lead carbonate or magnesium carbonate to one gallon of the 10% solution. (The full strength formalin is not neutralized by these agents.) The pathologist can refix tissues easily in Bouin's, Zenker's, or other solutions where differential staining methods are required.

■ For correct fixation, it is essential to use thin slices of tissue with large quantities of fixing fluid. The width and length of the sections preferably should not exceed an inch or two, although this factor is relatively unimportant, as the specimen can easily be trimmed after fixation. The thickness, however, should rarely exceed ⅛ inch, as it is impossible to expect proper fixation of large masses of tissue. The volume of the fixing fluid should be from 20 to 25 times greater than the volume of the specimen or specimens. It is advisable to use wide mouth jars (Mason jars are excellent and inexpensive, and are sold in a variety of sizes), not so much to facilitate insertion of the specimen but that it may be removed easily. Fresh specimens can be forcibly pushed into narrow-necked bottles and jars but tissue fixed in formalin solution is hardened, has little elasticity, and is usually impossible to remove from such jars without breaking the jar or damaging the tissue. For biopsy material,

All nerve tissue should be packed with as much care as is the spinal cord

which is usually smaller, a one- or two-ounce wide mouth tablet vial is excellent.

Formalin solution penetrates the brain and spinal cord well, and such specimens may be preserved whole. The best procedure for the brain is to suspend it in the solution by means of a string tied about the basilar artery, although this is usually unnecessary if an inch layer of absorbent cotton is spread over the bottom of the container. The spinal cord is preferably fixed in a long, narrow jar which will accommodate the total length of the cord without bending and twisting, in which case it is suspended by a string. However, such jars are often unobtainable, in which case the cord should be cut into one- or two-inch sections.

In all cases surgical specimens should be fixed immediately following their operative

removal, and should not be left to lie around the operating room. Convenient receptacles can be kept on hand containing fixing fluid. Necropsy should not be delayed following death or euthanasia; if it cannot be performed immediately, the cadaver should be kept in as cool a place as possible, preferably in a refrigerator. Specimens for histologic study must be handled carefully, avoiding unnecessary manipulation and trauma. Sharp knives and scissors can be used to trim the sections to their proper sizes; pinching with fingers and forceps and drying out of the surfaces should be avoided. It is important to secure representative sections of a specimen that shows a lack of uniformity in macroscopic appearance. It is also advisable to obtain several sections from specimens which appear uniform. If possible, sections should include the normal appearing tissue at its junction with or demarcation from the pathologic lesion. Sections of neoplasms, suspected tumors, and other lesions covered with epithelium should always include the covering membrane.

A receptacle such as this is desirable when sending a dog's head in case of suspected rabies.—*Baker and Klussendorf.*—*Cor. Vet.*

■ A complete record of the case should always accompany the specimen or specimens, including a description of the animal, history, symptoms and treatment. With surgical specimens, the color, size, appearance, anatomical location and other relevant data should be noted. With necropsy material, mention must be made of the lethal agent used if euthanasia was performed and the length of time that the animal had been dead before the postmortem examination was made. Nembutal is the recommended lethal agent, since both strychnine and chloroform often produce pathologic changes that may confuse the examiner.

Great care should be taken to prevent distortion or trauma to a specimen of this type (cystic ovary)

Summary

1. For the clinician, the best general fixative for surgical and necropsy material is a 10% solution of formalin, preferably neutralized with calcium carbonate or other carbonates.

2. For proper fixation the sections should not exceed ⅛ inch in thickness, and the volume of fixing fluid should be 20 to 25 times greater than the volume of the specimen or specimens.

3. Surgical material should be fixed immediately following operative removal and necropsy examinations performed as soon as possible after death.

4. Representative sections should include all observable macroscopic changes. Trauma and distortion of the specimens should be avoided.

5. A complete history of the case including all pertinent data should accompany the tissues.

Pullet Disease*

A Cholera-like Disease of Poultry

By J. F. RYFF† and H. J. STAFSETH
East Lansing, Michigan

FOR the past ten or more years a disease of young chickens and turkeys, closely resembling fowl cholera symptomatically, has been observed more and more frequently in the Atlantic and north central states. A few months ago information was received to the effect that the disease has been recognized on the Pacific coast. This disease occurs mostly during the summer and early fall. It usually makes its appearance soon after the pullets have been housed, when egg production has reached approximately 50%; in other words, when the birds are five to seven months of age. Even younger birds may be affected. Jungherr and Levine[1] have observed it in four-weeks-old chicks.

Etiology

The cause of this disease has not been determined. Jungherr and Levine[1] were unable to reproduce it with infectious agents. On the basis of their pathological studies they regard it as an expression of a metabolic disorder.

At the Michigan Agricultural Experiment Station one of us (J. F. R.) made numerous attempts at finding an infectious agent that could be proved to be the primary or a concomitant cause. The fact that members of the genus Escherichia are usually obtainable from the tissues of birds dead with this disease made it seem desirable to investigate this group of organisms as to a possible causal relationship. By intravenous and intraperitoneal injections of rather large doses of colon bacilli, symptoms and gross pathological manifestations, which resembled strikingly those of pullet disease, were produced. There were even some similarities in the histopathology of the disease caused by *Escherichia coli* and pullet disease as described by Jungherr and Levine.[1] However, the microscopic study of colibacillosis was not carried far enough to warrant any statement as to the degree of similarity in the two conditions.

Attempts at causing infection by oral administration of colon bacilli failed. These organisms were given in regular poultry mashes for prolonged periods without harmful effects. In view of the fact that pullet disease seems to affect mostly birds that are pushed for production and are rather fat, a mash containing 30% protein was substituted for the standard mash in this experiment. Prolonged feeding of this mash, to which large quantities of colon bacilli were added, failed to cause any evidence of disease. A search was made for particularly virulent strains of colon organisms, which might be able to produce this disease through natural channels, but none was found.

In some of the feeding experiments bile was administered to the birds with the idea of increasing the permeability of the mucous membranes, thus favoring bacterial invasion. No ill effects were observed. Since pullet disease has the appearance of a more or less acute toxemia, attempts were made to prepare toxic materials from colon bacilli which, by injection or oral administration, might prove effective in producing the disease. These materials proved to be without any perceptible pathogenic effect.

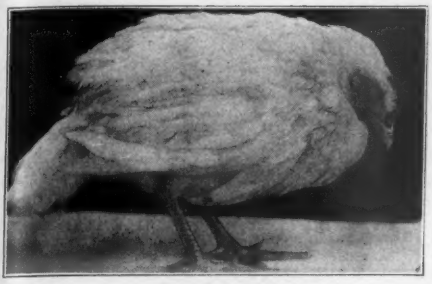
Some birds were vaccinated with killed cultures of *Es. coli* in order to see if birds so treated might show resistance to certain strains when injected intravenously or intraperitoneally. No difference in strains could be detected by this procedure. Chicks proved no more susceptible than older birds to oral infection.

Attempts at lowering the resistance of the birds by such means as chilling, excessive use of lights, feeding of chemicals

* Journal article No. 434 (n.s.) of the Michigan Agricultural Experiment Station.

† Resigned September 1, 1941.

[1] Jungherr, Erwin and J. M. Levine, 1941. The pathology of so-called pullet disease. *Am. Jnl. Vet. Res.* 2:4, pp. 261-271.



Pullet disease, at times, may resemble fowl typhoid

and mechanical objects that might injure the intestinal tract, failed to aid infection.

This work indicates that colon organisms are merely secondary invaders and not the cause of pullet disease. Additional support of this conclusion is found in the fact that colon bacilli can relatively seldom be isolated from the tissues of birds that are in the early stages of the disease. In advanced cases such isolations are common. It must not be forgotten that colon bacilli are not infrequently isolated from certain tissues, such as the ovaries, of apparently healthy birds. On the other hand, colon bacilli do undoubtedly, under certain conditions, become pathogenic for man, beasts and birds. It would, indeed, be interesting and useful to know why these organisms do so.

Symptoms

This disease usually affects birds which are in good physical condition, perhaps tending be be a little too fat, or birds that are pushed for production by feeding and excessive use of lights. One of the first symptoms is a marked drop in egg production. The onset is usually sudden and, because of the good condition of the birds, totally unexpected. Conspicuous symptoms are: Cyanosis of the skin of the head, comb and wattles, droopiness, coma, profuse ill smelling diarrhea and sudden death. In less acute cases the birds may live for some time and die in a comatose condition. There may be high fever, or the temperature may be normal or subnormal. Some birds show constipation. The crop may be dilated with a sour-smelling liquid content. Recoveries occur. According to Jungherr and Levine[1] the average morbidity is 21.7% and the mortality 5.2%. There is considerable variation in this syndrome. While this disease is referred to as a cholera-like disease, it should be remembered that pullet disease, in its various manifestations, may resemble botulism, leucosis, fowl typhoid and other bacterial diseases.

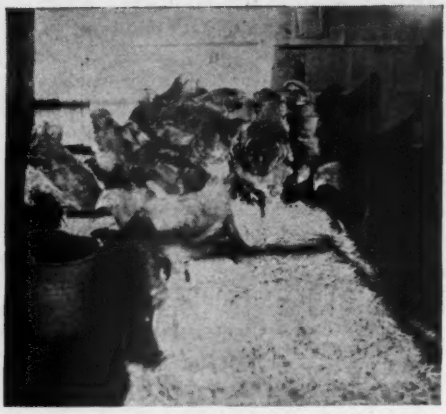
Pathology

For a detailed description of the pathology of pullet disease the reader is referred to the excellent description of Jungherr and Levine[1]. The following manifestations are commonly observed. Dark discoloration of muscles with fish-flesh-like areas in the breast muscles and the adductors of the thigh; shrivelled leg muscles; dehydration as evidenced by a shrinking of the otherwise well developed breast muscles; chalky, mottled appearance of the pancreas; shrunken, lobulated, collapsed or ruptured ova; peritonitis with either fibrinous exudate or merely coagulated serous material covering the liver; excessive amounts of urates in the kidneys; grayish yellow spots (focal necrosis) in the liver; petechiae in the serous membranes and in the heart; serosanguineous exudate in the pericardium; catarrhal or hemorrhagic enteritis with either watery or tenacious mucous intestinal contents.

It is not intended to convey the idea that all these changes are pathognomonic of pullet disease. For example, the shrunken, lobulated, collapsed or ruptured condition of the ova undoubtedly may be associated with other disturbances. When a laying bird is put out of production for a sufficient length of time, the ova will undergo atrophic changes which will give them at least some of the appearances described above.

Diagnosis

The flock history, the time of the year during which the disease occurs, the symptoms and lesions observed must all be taken into consideration in making a diagnosis. A negative bacteriological examination is, of course, rather convincing. It must be pointed out that this disease is mistaken for cholera in some localities. In Michigan, and perhaps several other states, cholera is now almost extinct. Nevertheless, diagnoses of cholera are rendered, especially by repre-



At first pullet disease may appear to be botulism

sentatives of so-called poultry health laboratories, who also sell cholera or cholera-typhoid vaccines. Obviously the use of such products is useless in the case of pullet disease. Microscopic examinations of blood smears, stained for the bipolar appearance of the *Pasteurella avicida*, may be misleading also because colon bacilli sometimes are present in considerable numbers in the blood of birds affected with pullet disease or other ailments and they sometimes show bipolar staining. In dealing with this disease and in reporting on diagnosis it is well to remember that it passes under many names, such as acute toxemia, blue comb, summer disease, housing disease, unknown disease, X disease, XX disease, cholera-like disease, and contagious indigestion, all of which refer to certain special features associated with it, such as symptoms, seasonal occurrence and an obscure etiology.

Treatment

To date, no scientifically tested and approved treatment is available. Field observations indicate that favorable results may be obtained if certain treatments are instituted fairly early in the course of the disease. According to Dr. E. S. Weisner, Extension Veterinarian in Poultry Pathology, Michigan State College, the following treatment gives good results if administered in time. Take away all drinking water before the birds leave the roosts in the morning. In place of it give them two gallons of water containing ¾ pound (12 oz.) of Epsom salt per hundred birds. Leave this solution before them 30 to 45 minutes, and then give them water containing one teaspoonful of finely powdered potassium or sodium dichromate per four gallons of water, or one teaspoonful of finely powdered copper sulphate per two gallons of water. The potassium or sodium dichromate can be left before the birds indefinitely, but the copper sulphate solution *must not* be given longer than four days.

Birds that are too sick to drink will often make spectacular recoveries when given a dose of iodine vermicide (Merck) as recommended for worms.

Jungherr and Levine[1] report apparently good results from a treatment consisting of placing the birds on a special wet mash for three hours every other day during one week, this mash consisting of 50 parts of oats, 50 parts of bran, 10 parts of molasses and 5 parts of water. Recently this treatment was augmented by medicating the drinking water as recommended by Weisner. In this combination treatment the medicated water is offered in earthenware vessels on the days when the special mash is given. In Michigan we have not found it necessary to use special drinking vessels, as the chemicals used do not harm metal containers.

The success of this treatment depends on prompt administration, preferably in the early stages of the disease. Therefore, remembering the seasonal occurrence and the sudden onset, poultrymen should be watchful during the months of June to November and especially during August to note any marked drop in egg production or any other symptoms which signalize the prodromal stage of this disease and to administer promptly one or the other of the treatments described. Obviously a serious attempt should be made to obtain a reliable diagnosis before the treatment is applied. Diseases such as fowl cholera, fowl typhoid, paratyphoid, acute pullorum disease, leucosis and botulism which, in certain stages, show symptoms very similar to those of pullet disease, would not respond favorably to these treatments.

Autobiography of a Veterinary Practitioner

By E. T. BAKER, Moscow, Idaho

VI. Sheep Problems

THE Northwest is a great sheep growing section, with many outfits "running" thousands of animals. Two natural advantages are, in the main, responsible; first, protected river valleys, which allow winter pasture and exercise; second, national forests, which afford ideal summer range.

It will be a long time before I forget my sudden and informal introduction into sheep work, which came about as follows: One morning, Doctor Nelson came into my office, holding a telegram, and said:

"McGregor Brothers are having trouble with some sheep and lambs up in the mountains, and want help. Can you catch the noon train for Forest, where they will meet you this evening?"

I nodded my head weakly, for that is about all an assistant can do when his boss asks him a very pointed question. Doctor Nelson then added:

"Peter McGregor is one of our college regents, and a great friend of ours. It will be up to you to make good."

This was welcome news to a young man hardly a year out of school, who had never "doctored" a sheep in his life. About all I knew regarding the "critters" was that one of them had followed Mary to school one day, and had thereby violated some state or city ordinance. Although Ohio is the leading pure-bred sheep state even today, I had entirely skipped all references to the matter while in college.

There is always one great advantage in starting from scratch, and that is one can never know less about the subject. I determined then and there to brush up on ovine pathology, and rushed over to a library, where the librarians went over their list of books pertaining to sheep and wool. We could find only a few scattered articles on scabies, liver fluke and foot-rot, and these were from English sources. I remembered enough of "Sep" Sisson's teachings to know that the anatomy of the sheep is very similar to that of the cow, so I had that much knowledge to fall back on. However, I was young and irresponsible and possessed a strong back and what goes with it, so, without any further worries, I caught the noon train, and landed in Forest that evening. It was a beautiful day in June, and the air was as crisp as early winter down in the farming sections.

John McGregor met me at the station with a team and an old hack, and my luck was to hold, for he proved to be one of the finest men I have ever met. When he succumbed to the "flu" in the great epidemic of 1918, I felt that I had lost one of my best friends. He was a typical westerner, having come from Scotland years ago when but a youth, and with three other brothers had become quite wealthy in the farming and sheep business. Still, he was as common as any of his men. I have always found men of that type the same way. Their home ranch consisted of 36,000 acres along the Snake river, with over 2,000 acres of farm land. At that time they were running 14,000 sheep and lambs, divided into seven bands.

As it was late when we arrived at the camp, we had supper and then went to bed, for, although it was nearly the Fourth of

July, there were large snow banks under the deep recesses of the tall fir and tamaracks. The next morning we were up at daylight, and the herder said he had counted over 600 dead lambs. For breakfast, all we had was a big dish of canned peaches, ham and eggs, sour dough hot cakes, syrup, butter, and three sheep herder cups of coffee, each one holding nearly a pint.

After breakfast we took a walk around the bedding grounds, and the herder said:

"Taint pizen, 'cause they ain't afrothin' at th' mouth. They jest git lame and cripple around fer a bit an' then kick th' bucket."

Getting out my autopsy knife, I began to examine a lamb whose earthly existence had come to a sudden end, but all I could find was a mass of mottled wool, clotted blood, and the internal organs just as God had made them. I was puzzled, to say the least, but had the presence of mind to say nothing and look wise. For over 30 years I have found this routine of inestimable value.

At that embarrassing moment a lamb came hobbling across the gulch and lay down near me. I walked over to it and passed my hand down over its rump and hind legs, and heard a crinkly sound, much like pressing on waxed paper. I then remembered I had felt that same condition in a calf dying with blackleg, and with youthful enthusiasm told Mr. McGregor it acted much like that disease. The next thing was to drive back to the railroad station and wire for some vaccine, which was in the old government powdered form, and made for calves.

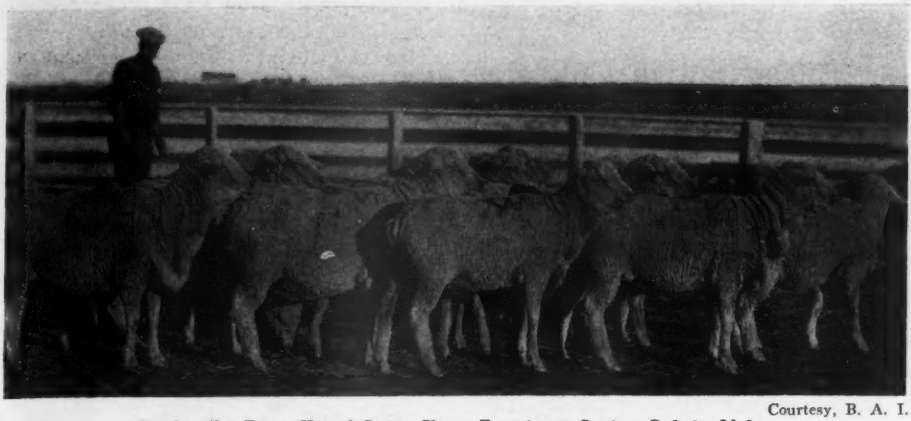
When the vaccine arrived that evening, we had prepared a chute and a raised platform to place the lambs upon, so I would not have to break my back stooping over. I have always been a great believer in saving my delicate physique from all needless exertion.

There were more problems to solve than confronts a European neutral when war first breaks out over its boundary, for the dosage, site of injection and methods of mixing the vaccine had to be worked out. I finally figured that about half the calf dosage would be correct, and as there were around 1400 lambs to vaccinate, it would

Sheep infected with blackleg. Note the enlargement of the right leg and the edematous fold of skin between the legs

take 2,800cc, allowing 2cc for each lamb. Using an old tomato can, well scrubbed out, we measured out what we hoped would be one full quart or 1000cc. Cleaning a wash pan, we emptied 750 doses of the powdered vaccine into it and gradually added lukewarm water, using a big spoon to stir it. One soon learns to make the best of it out in practice or in the mountains. I had determined that the axillary space would be the most convenient site of injection and figured out that a man could hold up the lamb's left front leg while I injected it.

Mr. McGregor had rounded up several boys from the nearest homesteader's ranches, and we started in. I found I could inject more than 100 an hour, with two men running the lambs through the chute; one boy to hold the animal's leg up, and one boy to keep the solution stirred. I used a solid, all metal, three-ring hypodermic syringe, made to my order by Sharp & Smith for tuberculin work. No antiseptic was used, and no cases of lameness occurred as I had a short needle.



Courtesy, B. A. I.

Rambouillet Ewes, United States Sheep Experiment Station, Dubois, Idaho

We finished the next day, and a change in bedding grounds was suggested. Whether this latter move or the potency of the vaccine could be given the credit, only a half-dozen more lambs died. One of the boys told me a number of calves had died some years before in this same gulch, but they had blamed poison plants for the loss.

Because of my good luck in this case, Mr. McGregor began telling other sheep men about me, and, before I realized it, they began to call me for all sorts of trouble. In order to keep up with this newly found reputation, I had to study the subject from every angle. When my book was written six years later it contained the results of "practical experience," and not mere theory.

All an owner desires is to have his sick or dying animals cured or protected. He is not interested in the cause, pathology or complications. He cares not one single hoot whether the attending veterinarian wears a Phi Beta Kappa pin or a pair of overalls. All he wants is successful results.

I soon came to the conclusion that all I needed to know about sheep diseases was a working knowledge of the ones occurring in my particular field. The more I studied the subject, the more I realized how little I knew, and how vast the field really is. For example, the New England practitioner has an entirely different line of problems to meet than the man in the south. The lamb feeder in the middle west is not interested in the grease wood problems of Wyoming or rubber weed poisoning in Utah or New Mexico. I have never seen a case of anthrax in a sheep, but if that disease began to appear in my territory, I would make a determined effort to find out all I could about it.

Then again, as practitioners, we should be familiar with the various breeds kept in our territory. We should be able to talk to sheep men in an intelligent manner, but at the same time be frank in admitting we are not experts on pedigrees, or claim to be authorities on management.

I have gone into detail about how sheep practice was literally "shoved at me." I had to learn what little I know the hard way, but it probably was worth it.

(To be continued.)

* * * *

Keeping down expenses is an art. One is born thrifty or he is not. We figure if we can save five dollars by not purchasing something we can get along without, it is just the same as going out in the snow or the mud and making five dollars. Some practitioners are constantly in debt with a $5,000 a year business, while others are comfortably fixed on a $3,000 income. We have known men who will go into a pool room and spend twenty dollars on slot machines or drinks "for the crowd," and then squawk like a stuck pig when the wife asks for a dollar to buy a pair of stockings.—*E. T. B.*

Beware —
The Suave Collector

Has the suave solicitor for the racketeering collection agency visited you yet? If not, you may look for him any day now because he is canvassing veterinarians with dive-bomber gusto seeking delinquent accounts. In normal times, his loot was sweet enough but today it is going up with war production because the trickster knows that many debtors are earning more money now than heretofore and will pay old bills readily with little collection pressure. Most veterinarians are overlooking this fact, particularly if the accounts have been written off and buried in the files.

The fake collection agency obtains the accounts by masquerading as an accounts-purchasing or discount company. Its salesmen offer to buy the accounts under a purchasing plan through which the veterinarian will receive a percentage of their face depending on the age of the accounts. About 30 days will be required to verify the accounts and to complete the purchase offer, so the salesman says. The contract seems to check with his statements but trick wording obscures the intent. Actually, it gives the agency the privilege to purchase some or all accounts, if in its opinion, the debtors are good risks or can furnish acceptable collateral. It doesn't obligate the company to pay a nickel. The accounts-purchase or discount offer sweetens the proposition sufficiently to make it easy to get the accounts for collection at exorbitant rates. Once the contract is signed and the accounts turned over, the veterinarian can hope for little more than a Japanese promise for his share of the collections. Usually the victim does not know that he has signed a collection contract until informed of the agency's activities by his debtors.

Beware of such collection racketeers and their promises to buy accounts for immediate cash. Their purchase plan is merely bait. Their contract doesn't back up the salesmen. Often the real agreement is printed in fine type on the back of a sheet used for listing accounts or is given seeming unimportance by some other camouflage. After the contract is signed, it is useless to demand settlement on the basis of the salesman's promises because, the agreement invariably contains a clause disclaiming all representations not made therein.

Contracts used by collection racketeers are drawn on a heads-I-win-tails-you-lose basis. Service fees, docket fees, office filing and attorney fees vary from 50 cents to $2 per account, whether or not the account is collected, and may entirely eat up equities in small accounts or part-payment collections due after agency commissions are

deducted. One veterinarian submitted 26 small accounts and balances totaling $89.81, the agency eventually sent a statement showing $12.43 due the veterinarian on collections made, but charged a 50-cent service fee on each of the 26 accounts, totaling $13, and asked him to remit 57 cents. Another veterinarian was told that commissions on collections would be 25% but the salesman failed to explain that if accounts were collected in part payments, the rate would be 50%. The agency reported as collecting partial payments and deducted 50% commission, whereas, subsequent investigation disclosed that some debtors had paid up their balances in full, which would have entitled the agency to only 25% commission. When notified, the agency sent the veterinarian the difference but the trick of collecting in full and reporting payments on installments at higher commission rates has been a lucrative one for these gyps. They pay up if found out but, too often, the deception is not discovered.

The salesman, of course, says nothing

about the "double-talk" in the contract. For example, he won't tell the veterinarian that assignment of the accounts (which these contracts call for) divests him of control over them for a year or more; and if accounts are withdrawn or dropped during that period, the commissions, which run from 20 to 50% without service charges, are

due the company. Often one is asked to list the accounts on a form, which happens to be the back of the copy of the contract that the salesman keeps so the veterinarian has no definite record of the accounts turned over. This adds to the confusion and the opportunity for trickery.

These are highlights of the racket and although the verbal hocus-pocus may vary in different contracts, the theme song is always the same; you are promised cash for your accounts upon verification, but, in reality, you can warble for your money—not only before it is collected, but often afterward. Veterinarians and other creditors have found that is harder to collect from these companies than from the original debtors.

Some of these concerns provide the veterinarian with forms or stickers stating that if an account is not paid in 10 days, it will be turned over to a collection agency. Every experienced collection executive knows that this announcement brings in up to 30% collections. Debtors often ignore the veterinarian's duns but when an official notification, impressive and usually supplied by the collection agency, is received with its implication of court action, many will come through with settlements pronto. One veterinarian mailed out such forms supplied by a gyp agency and collected a total of $121 of accounts amounting to $200 on which the agency received $47.90 commission—an average of 40 per cent. Eventually, the veterinarian received a statement from the agency stating that they had collected $76 more on these accounts, of which the veterinarian was entitled to $41.30 as his bit after agency commissions and service charges had been deducted. In other words, the veterinarian gave the accounts to the agency for collection, used a few impressive forms supplied by them which he mailed to debtors at his own expense. The agency received $47.90 from collections made by him when he used the forms supplied by them—he got $41.30 for the remainder of his accounts. They returned to him $6.60 less than they had taken from him as commissions (on his own collections). The total collected was $197. The agency collected only $76 but together with what they retained ($41.30) and the $47.90 on the veterinarian's own collections, it was $82.60 to the good for collecting only $76 worth of accounts. This indicates that aggressive collection methods would have brought in the money without outside assistance.

Some of these gyps make no attempt to

collect at all, just list the names and wait after notifying the debtors that they have the accounts for collection. They urge their salesmen to get as many recent accounts as possible, preferably under a year, because they know that the law of averages will bring in at least 20% of this money without effort and they can appropriate up to 50% of these payments by merely maintaining a small office and card file and reporting to the client that they were collected on the installment plan.

A variation of this scheme, which has caught a number of veterinarians, makes

use of a refund check. Upon offering the system, consisting of a series of form notices and letters, the salesman guarantees that, used according to instructions, it will collect a certain amount. If not, the veterinarian may deposit the guarantee check after the stipulated date and get his purchase-money back. But the check is so worded that the bank will not cash it until the collection agency has O.K.'d it and they usually find a reason for refusing approval.

Many complaints have been received by Better Business Bureaus, Chambers of Commerce, business publications, trade and professional associations, legitimate credit

They love their pets but—how they hate to pay when the bill comes in

bureaus and attorneys—but it seems that these racketeers live up to their printed contracts. So, the next time don't let a persuasive agent talk you in to letting him collect your overdue accounts. It may result in the loss of your accounts and his collecting from you in addition.

This is not written as a warning against collection agencies in general, because there are many dependable credit and collection bureaus in all parts of the country, but there is one way to detect the spurious. If a salesman for a collection agency guarantees immediate cash for your accounts on any sort of a plan, you may be sure there's a Jap on the job somewhere.—*Fred Merish, Pompton Lakes, N. J.*

Brucellosis in cattle is a public health problem in nearly every community

Experience with Brucellosis Vaccine

There is no evidence to indicate that calves vaccinated against brucellosis can spread infection to susceptible animals. There is no evidence that strain 19, used under field conditions, becomes established on the premises nor increases in virulence by passage through susceptible animals. There is no evidence that vaccination with strain 19 results in the establishment in the udder during lactation.

My experience with vaccination against brucellosis of cattle is summarized in the foregoing. Calves vaccinated at about five months of age have become negative to the agglutination test at from six to eight months of age; older animals required a longer time to become negative.

Each herd presents a problem of its own and must be handled as an individual case. In one herd, made up of valuable animals, I vaccinated everything on the place. One cow had aborted; all had high titers. No more abortions occurred; all cows had normal calves; all calves and first-calf heifers have now (one year later) become negative. Needless to say, as calves reach five months of age now, they are vaccinated. I am convinced from my own experience that calfhood vaccination, and in selected cases vaccination of older animals, is highly successful.

A. A. DAVIES

Linden, Mo.

Cerebrospinal Euthanasia in the Dog

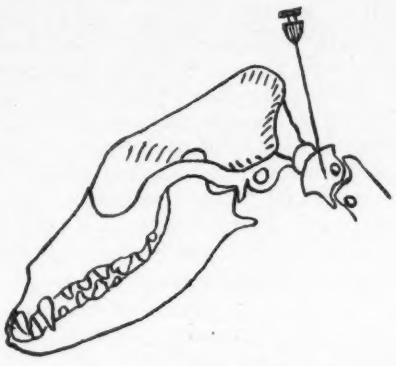
The term euthanasia means easy painless death—literally pleasant death. It is often the disagreeable duty of the veterinarian to end the lives of dogs for many humane reasons. For several years the veterinary clinic of the Kansas State College has been studying this subject in an effort to discover an improved method. Most types of euthanasia are objectionable because of danger to the operator, irregularity of action, embarrassment before the client, high expense, or making a bloody mess.

After numerous experiments a method of affording dogs a painless, easy death has been developed. This method is cerebrospinal euthanasia. The idea was conceived by the author, while drawing cerebrospinal fluid from chorea cases. It has been enthusiastically received by all who have observed its administration. The process—in some respects resembling the old pithing operation on horses—is carried out by depositing in the medulla oblongata a solution capable of embarrassing the vital centers and at the same time incapacitating the spinal cord.

The site of injection is immediately behind the occiput. The most accessible passage to the cerebrospinal cavity is between the occiput and the atlas. A two-and-one-half or three-inch, 16-gauge needle is inserted, bevel toward brain, one-half inch behind the occiput, and thrust at a slightly posterior angle into the opening at the junction of the spinal canal and the foramen magnum, which harbors the medulla oblongata. The operator will be pleasantly surprised at the ease with which this spot is struck.

Death by this method is instantaneous. There is no objection to insertion of the needle as this location is exactly on midline where sensitivity is slight. It is best to operate with the animal in ventral or lateral recumbency. One will find that if a bandage muzzle is applied in such a manner as to flex the neck slightly, the opening between the skull and the atlas is enlarged. Thus an easier target is created.

The advantages of this method of euthanasia are many. Primarily it is much more humane. There is none of the element of uncertainty of most other types of humane destruction. It is quicker, easier, and blood-



The animal should be in ventral or lateral recumbency. The most accessible site of injection is immediately behind the occiput—between it and the atlas

less. There is no apparent evidence of pain. The operation can be done in the presence of the most sentimental owner with the assurance that there will be no blood, no unsuccessful search for an evasive heart, and no prolonged period of suffering, as is sometimes the case in intracardial euthanasia. Evidently the tail wagging center is affected, because most dogs that have been killed by this method have died wagging their tails. As unimportant as this seems, it is quite impressive to some owners, as it indicates a happy end.

Many liquids have been used in experiments in an endeavor to find the one most desirable. However, to date, 10cc of either chloroform or ether have given the best results; having killed all dogs immediately. We have not had an opportunity to use it on any of the large breeds. With them it may be necessary to administer more than this amount.

The types of euthanasia in general use are: electrocution, intracardial magnesium sulphate injection, intravenous nembutal injection, and the administration of strychnine, carbon monoxide, cyanide, or chloroform. Unfortunately, all of these methods

have disadvantages. The element of danger from accidents is great in electrocution. Intracardial injection is an inconsistent, bloody process requiring practice to obtain the best results. Nembutal injection, although very good, is too expensive to be practical. Strychnine offers many potent dangers to the careless operator and is also quite painful. Carbon monoxide administration is slow and requires considerable apparatus, while cyanide poisoning offers the formidable dangers of strychnine in greater degree. Chloroform is slow and usually entails a struggle with the patient. These disagreeable characteristics are entirely eliminated in the process of mercifully killing dogs by cerebrospinal euthanasia.

RICHARD J. GORMAN,
Kansas State College '42

East Hartford, Conn.

★ ★ ★ BUY WAR SAVINGS STAMPS AND BONDS

Heartworm Infestation of Dogs

In two years of practice, in Mississippi, I have treated about 100 cases of *Diroflaria immitis* infestations in fox hounds, pointers, setters, etc. This condition is becoming more and more prevalent each year.

Dog owners throughout this section had always believed the condition to be a chronic form of distemper, or an after effect of that disease, until I made routine blood examinations and thus revealed the trouble.

In reviewing the past histories of the dogs, it seems as though the condition manifests itself more often in well kept, seemingly well-conditioned dogs. The history generally given when the animal is brought in is as follows: the dog apparently was in fine condition, full of life and with a good appetite but within a day or two he seemed to literally dry up, develop a low, deep cough, and refuse his food.

A dog infested with heartworms becomes listless, has a definite conjunctivitis and is stiff in movement. There is a tendency to lie in a cool, shady place all day.

Also, I have seen the type of heartworm infestation that causes the animal to droop around in a lackadaisical condition. He will hunt awhile and then suddenly quit. There seems to be a pronounced ascitic condition in this type which is due to faulty blood circulation. In speaking of it the owner uses the expression "pot-bellied."

A fox hound had been running fine races, seemingly in good condition, until one day he literally fell out of the race. A microscopic examination of his blood showed marked filariosis.

If an animal appears in fair condition 2cc of fuadin is given intravenously (for a 40-pound dog). The intravenous route has always given me better results than has the intramuscular.

If the dog appears dehydrated he receives 5% dextrose solution (100cc daily) until the dehydration is overcome. I generally follow a recommended treatment[1] for fuadin dosage, but I find in most cases it is necessary to give 10 to 12 injections before there are any markedly beneficial results.

If there is any catarrhal condition present sulfathiazole (30 grams daily for about five days) is administered. There is always a marked improvement in heartworm patients after about four injections of fuadin.

Another blood examination is made about a month after a heartworm case has been discharged.

Lately, there has been a definite trend toward filariasis in young dogs. We were taught that this seldom appears in young dogs but quite frequently I have found heartworms in dogs between one and a half to two years of age.

An orchitis often occurs in patients when fuadin is given intravenously. In that case treatment is suspended for three days and hot Epsom salt packs applied. This allays the swelling which invariably clears up within three days.

In administering the drug injections are distributed in the front and hind legs into the radial and saphenous veins.

As a rule, dogs tolerate fuadin very well. No bad results have occurred in the treatment of more than 100 cases.

H. B. TITLE

Laurel, Miss.

[1] Winthrop Chemical Co.

Intussusception in a Beaver

December 29, 1941, a 40-pound male beaver was brought to the veterinary clinic of Kansas State College, for necropsy. He was from the Zoological Park of Manhattan.

The animal had shown no noticeable symptoms of illness the previous evening, but had shown signs of a diarrhea the week before, passing feces of a dark chocolate color with streaks of yellow.

The ileum showing intussusception

The feed consisted principally of corn, wheat, and oats, supplemented with branches and twigs of aspen, birch, cottonwood and elm. The water in the pond had previously become loaded with dead leaves and had turned a light red color, but this had been remedied as soon as it was noticed.

Necropsy disclosed an intussusception of the terminal six or seven inches of the ileum through the ileocecal valve into the cecum proper. The involved portion of the intestine was hemorrhagic and edematous, and the mucous surface had ruptured at several points. The associated blood vessels and lymph glands were hyperemic and edematous. The accompanying photograph, with the base of cecum incised, shows the position of the involvement. No indications of a septicemia were found in the remaining organs.

The cause of death was probably a toxemic condition as a result of degenerative changes in the tissue of the intussusception, the exact cause of which was not determined. In domestic animals, such involvements of the digestive tract are usually attributed to arhythmic contraction of the smooth muscle caused by an irritating substance, either food or medication.

Diseases of the beaver are rarely encountered by the average veterinarian. Laymen, both fur raisers and sportsman, should be encouraged to bring carcasses of wild animals to their veterinarian, because it is only through such cooperation that new knowledge of wild-animal diseases can be obtained. A program of such cooperation should open a new and profitable field for the veterinarian, and benefit those financially interested in such animals and contribute to national conservation.

BEN SHAMBAUGH, JR.

Ottawa, Kns.

A Practical Casting Harness

For casting colts, I use a casting harness similar to T. A. Sigler's,* but applied slightly differently. It is made with ⅝-inch cotton rope 45 feet long. The rope is doubled at the middle and tied loosely about the neck. The knot is placed at the withers and tied in a bowline so that it never pulls tight and can be untied easily. The two ends are brought down on either side of the body around the hind legs from the outside, between the hind legs and back up through the rope collar. The loops are then allowed to drop to the hind pasterns and with a man to pull on each rope and one at the halter I cast the colt on its left side [since I am right handed], and put a figure-of-eight hitch on the right hind leg. The rope holding the left hind leg is simply pulled through under the colt and held by an assistant; it is not hard to hold, since the colt is lying on it.

In addition to the rope I use straps on the front legs. The ones I use are a holdover from "horse and buggy" days; they are what we called pole straps, used to attach the neck yoke to the bottom of the collar when we drove two horses in a "double rig." For the benefit of those who have never known any way to ride except under

* See Fig. 11 on page 354 of the July, 1941, issue of VETERINARY MEDICINE.

a steering wheel, I will explain that they are made of harness leather, about 1¾ inches wide and 3½ feet long, with a buckle and two keepers at one end. After the colt is cast I slip one of these straps around each front leg just below the elbow, run the free end through the keeper, then flex the leg, take a couple of turns around the pastern, and buckle. Be sure to stay in the clear while applying these straps; one slap in the face by one of these front feet could start you on the road to the Great Beyond. Much experience has taught me to regard the front feet as warily as the hind ones.

I have used this tie for years and would not think of using any other. It is simple and safe. The rope, done up into a neat bundle with the straps wrapped around it, can be carried handily in one's car. Chain blocks and pulleys, etc., are all right for raising "downers," but I have no use for them when it comes to casting colts.

REMBRANDT MORGAN

Winfield, W. Va.

Veterinary Conditions in Oklahoma

Oklahoma, which became a state in 1907, had no veterinary practice act until 1913, and then the law was of little benefit to the livestock industry because many believed it to be unconstitutional and ignored it. The present Oklahoma veterinary practice act became effective in 1937. It has many excellent provisions; but is not perfect.

Oklahoma has 114 licensed graduate veterinarians and 73 non-graduates still holding licenses obtained under the 1913 law. Since many of these non-graduate practitioners are advanced in years, their number will diminish rapidly.

There are still several good locations in the state for qualified men where a splendid general practice can be built. The state has a favorable year-around climate and is fast becoming one of the leading states in the production of beef, pork and dairy products. Practically every veterinarian in the state reports an excellent practice and good collections.

As of February 1, 1941, Oklahoma had 2,359,000 cattle valued at $79,429,000; 990,000 hogs valued at $5,000,476; 305,000 sheep valued at $1,067,000; 341,000 horses valued at $15,500,000; 10,890,000 poultry valued at $5,118,000. These estimates are rather conservative, and of course the value is much higher at present prices. Undoubtedly there is more than one and one-half million dollars worth of live stock for each graduate veterinarian in the state, and this includes

Poultry & Livestock Journal

Many thousands of calves are produced each year to maintain the large cattle population of the state

Oklahoma veterinarians now in the military service of which there are many.

The Board of Veterinary Medical Examiners has made every effort to rid the state of empirics. Secretaries of the Board have written hundreds of letters warning those practicing illegally to cease practice. The Board has also assigned agents to conduct many special investigations as well as the general routine investigations carried on in all sections of the state. The Secretary writes all the veterinarians in the section where a general investigation is to be conducted and requests their cooperation and assistance. They are notified a few days beforehand of the intended arrival of the special investigator. On arrival he contacts them and obtains names and locations of all quacks in the locality. He explains the law to these quacks and stresses the penalty for violation of it. When possible he secures a signed agreement to cease practicing, or he may file a charge if the evidence and circumstances seem to warrant it. Such action by the Board has been responsible for a marked decrease of illegal veterinary practice in the state. As a rule the county attorneys have given the Board and its

investigators good cooperation. With a single exception, cases heretofore tried have been won by the Board. At the present time five cases are pending.

The Division of Veterinary Medicine of the State Department of Agriculture, consists of a State Veterinarian and two deputies. The primary duties of this office consist in regulating the interstate movement of livestock and enforcing the rules and regulations adopted by the State Board of Agriculture. This office cooperates with the state health department and the private practitioners in the control of communicable diseases. When an outbreak of disease is reported to the State Veterinarian, if a local practitioner is available in the county where it occurs, his cooperation is always solicited before the farm is visited, and should treatment be necessary, the owner is instructed to employ the local veterinarian. In counties where reaccreditation work for bovine tuberculosis and brucellosis is in progress, local practitioners are employed to do the work on a per diem basis. When diseases transmissible to man are reported, a representative of the Division of Veterinary Medicine of the State Department of Agriculture is detailed to the area to assist the state health department in the control or eradication of the outbreak.

SAMUEL R. ESPY

Oklahoma City, Okla.

Canine Leptospirosis

From data compiled through an early winter outbreak of leptospirosis in this community some interesting results have been obtained in the treatment of this disease.

Constant symptoms were heavy congestion of conjunctiva and sclera; complete loss of appetite; craving for water; extreme depression; vomiting (bile-stained); offensive mouth odor; marked dehydration. Abdominal pains were fairly constant. Constipation was the rule; rarely, diarrhea was present. Icterus was present in some cases and absent in others. The temperature ranged from 103° to 105°F. at the onset of the disease, sometimes going to subnormal in three to five days. No marked difference in age- or breed-susceptibility was noticed.

In all cases, positive diagnoses were made on the basis of the plate agglutination test in dilutions of 1:50, 1:100, and 1:200, with agglutination in five minutes at a dilution of 1:100 selected as positive. The test may show only a slight reaction in the 1:50 dilution in the early stage of the disease, but in three to five days a complete agglutination in the 1:200 dilution is constant.

Twenty-four dogs infected with leptospirosis have been treated. The first 19 were given intravenous medication, transfusions, gastric sedatives, etc., but there was no response, and death occurred in two to five days in all cases.

In the 20th case ethylenediamine dihydriodide,* an organic salt of iodine with 80% available iodine, was administered orally. Contrary to experience with such use of iodides, emesis was controlled within 24 hours. After 72 hours, increased respiration and heart action and a general systemic reaction followed the drug administration in one-half to one hour; the dosage was therefore reduced two grains per day for the following five days and then stopped completely. The patient was force-fed with broths, bouillon and a mixture of equal parts karo and orange juice. This was continued until the patient resumed voluntary feeding on the 27th day. During this time the dog lost nine pounds.

The same treatment and general care as in the previous case was given to four more animals. All recovered completely. The return of normal appetite averaged about three weeks to a month.

The serum agglutination test of these five dogs that recovered showed three reactions to *Leptospira canicola* and two to *Leptospira haemorrhagiae.*

The dosage of ethylenediamine dihydriodide given for a 20- to 30-pound dog is two grains three times daily for three days and two grains twice daily for five days.

Five recoveries are not enough to form any conclusions, but with the virulence of the infection so definitely established, the results are encouraging.

H. E. GASKILL

Las Animas, Colo.

* A commercial preparation (Hy-Amine, Pitman Moore Co.) was used.

Lymphatic Leucemia of a Cow

March 17, 1942, a 12-year-old, red cow was brought to the veterinary clinic of the Kansas State College with what the owner termed "udder trouble." She had been dried up several weeks previously and was not due to calve until the latter part of June. Her udder and mammary lymph nodes were so large that she could barely walk. The mammary nodes were becoming necrotic. There was extensive edema about the abdomen. The owner said the condition had been noticeable for six weeks and that he had dried her up thinking that the condition would correct itself. He stated that she had been an exceptionally good milker and normally had a large udder.

Examination revealed markedly enlarged precrural lymph nodes and some enlargement of the prescapular lymph nodes, temperature 102.2°F., pulse 120, and respiration 60 per minute. She had an alert appearance and a good appetite. A tentative diagnosis of lymphocytoma with cardiac involvement was given and a blood sample was taken to the laboratory for examination.

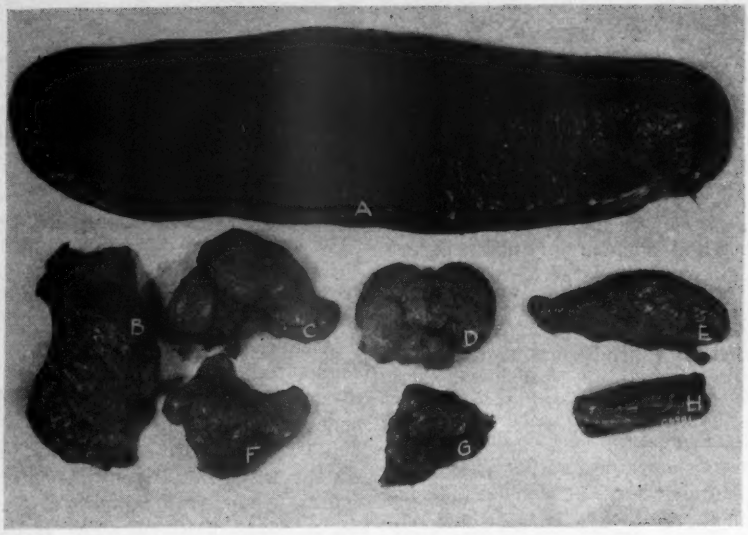
A total cell count, differential cell count, and hemoglobin determination gave the following results:

	March 17	March 18	March 19	March 20
Erythrocytes	4,100,000	3,750,000	4,300,000	4,750,000
Leucocytes	75,000	41,000	36,000	73,000
Hemoglobin (gms per 100cc)	8	7	7	7.5
Differential cell count:				
Eosinophiles	0	0	2	0
Basophiles	0	0	0	0
Myelocytes	0	0	0	0
Juveniles	0	2	0	0
Stabs	3	1	4	4
Segmenters	7	9	14	6
Lymphocytes: Large	15	4	21	25
Lymphocytes: Atypical	60 (83)	76 (87)	53 (78)	60 (90)
Lymphocytes: Small	8	7	4	5
Monocytes	7	1	2	0
	100	100	100	100

A specimen of urine of normal color and odor with a specific gravity of 1.013, gave a basic reaction and revealed a small amount of albumin. Tests for bile salts, sugars, and ketones were negative. Microscopically the urine showed pus cells and granulocytic leucocytes.

Four days later the cow had to be helped to her feet and as a small area on the posterior portion of the udder was sloughing the animal was destroyed. Postmortem examination revealed a fairly well-nourished carcass. The swelling on the ventral body wall was found to be due to an extensive edema of the subcutaneous tissue. Much of the tissue in this region was greatly thickened and appeared to be infiltrated with lymphoid cells. The udder tissue seemed normal but the supramammary lymph nodes were greatly enlarged, congested, and about one-third to one-half necrotic. The left external pudic artery and several of its satellite veins were enclosed in a mass of infiltrated tissue which was about 1 by 2½ inches in cross section by eight inches long. The veins were completely occluded by thrombi. Scattered over the wall of the rumen and in the wall of the intestine, throughout its length, were small, disc-like patches of infiltrated tissue. On the greater curvature of the omasum there was also a long mass of infiltrated tissue about 1½ by 3 inches in cross section and twelve to fourteen inches long. This mass had several blood vessels running through it from end to end which were probably branches of the

Enlargement of lymph glands is a characteristic of leucemia. Shown are the prescapular and precrural lymph glands (outlined by clipping)



LESIONS OF THE GLANDS IN LEUCEMIA

A—Spleen
B—Lungs
C—Submaxillary lymph glands
D—Bronchial lymph glands
E—Mediastinal lymph glands
F—Retropharyngeal lymph glands
G—) Mesenteric lymph glands
H—)

celiac. The right kidney appeared normal but in the left kidney the cortex of many lobules was infiltrated. The abdominal muscles, near their origin, had greyish-white patches suggesting cellular infiltration. The uterus contained a five to six month fetus which was normal in all respects. The heart showed a few nodules of cellular infiltration and considerable diffuse pinkish-grey infiltration throughout the myocardium. There was a slight patchy, diffuse infiltration on the costal pleura. The sheaths of the branchial nerves showed a slight yellowish discoloration. The pituitary body was about normal in size but there was a gelatinous-like substance replacing the mid-portion.

The liver showed albuminous degeneration, fatty metamorphosis, and lymphocytic infiltration of a rather diffuse type, which was most marked around the central veins. The myocardium also revealed extensive lymphocytic infiltration. The kidneys exhibited generalized albuminous degeneration of the tubules and some, though not marked, lymphocytic infiltration around the Bowman's capsules. The mass of tissue involving the pudic vessels was due to infiltration of lymphocytic cells. The edematous tissue appeared rather dense. It and the intralobular connective tissue were infiltrated with lymphocytes. The udder revealed considerable induration and some atrophy of the glandular tissue. The greyish-white foci in the skeletal muscles were found to be areas of lymphocytic infiltration in the intermuscular tissue. The nerve tissue exhibited lymphocytic infiltration of the perineural tissue, but there was no evidence of penetration of the epineurium by the process.

Laboratory and postmortem findings confirmed the original diagnosis. No treatment was given the animal.

WM. WEMPE

Frankfort, Kans.

* * * *

Reviewing the literature on the pathogenesis of chronic bovine mastitis, John Francis, a British research scientist, suggests that the preponderance of evidence is that a pre-existing state of "non-specific mastitis," possibly induced by hormonal factors, is a forerunner of streptococcal infection, and that further investigation along this line should prove fruitful.

Book Reviews

Bang's Disease of Cattle. *By George H. Conn, B.S.A.H., D.V.M.* Cloth bound; seven illustrations. Fred Hahne Printing Co., Webster City, Iowa, 1941. $1.00.

This is a compilation of reports of research on brucellosis in cattle, presented in popular style for the non-technical reader. The author has included only minor observations from his own experience.

* * * *

Vitamin E. A Symposium Edited by *A. L. Bacharach* and *J. C. Drummond.* Cloth bound; 88 pages. Chemical Publishing Co., Inc., New York, N. Y., 1940. $2.00.

In this monograph are produced the proceedings of a symposium held under the auspices of the Society of Chemical Industry in London in April, 1939. It is divided into three parts: (1) the chemical structure and properties of tocopherol (vitamin E); (2) the physiological action of vitamin E and the consequences of vitamin E-deficiency; (3) clinical and veterinary uses of wheat-germ oil and vitamin E preparations.

Of particular interest to the veterinarian is the paper contributed by Vogt-Möller on the use of vitamin E in clinical and veterinary practice, in which he summarizes his field studies on the use of wheat-germ oil in treating abortion and sterility.

* * * *

Microbes Which Help or Destroy Us. *By Paul W. Allen,* Ph.D., Professor of Bacteriology and Head of the Department; *D. Frank Holtman,* Ph.D., Associate Professor of Bacteriology; and *Louise Allen McBee,* M.S., Formerly Assistant in Bacteriology, University of Tennessee. Cloth bound; 540 pages, 102 text illustrations, 13 color plates. The C. V. Mosby Company, St. Louis, Mo., 1941. $3.50.

The ever-fascinating story of the microscopic and sub-microscopic organisms and their place in the human economy is here retold for the layman. The book is written in "popular" style, and the interesting and dramatic episodes in which the history of bacteriology abounds lose nothing in the telling.

The information given is accurate and for the most part up-to-date. Occasionally oversimplification gives rise to some rather misleading statements; for example, one can hardly consider the tremendous achievement of the virtual eradication of bovine tuberculosis from this country adequately described in the lines, "In the last quarter of a century, tuberculin testing has become so popular that numerous large dairy sections are now entirely free from tuberculous cattle." Again, the statement, "The mortaility of untreated cases in which the disease [rabies] appears is 100%, and from accumulated data it is concluded that there is not more than 1% mortality among treated cases," implies to the uninformed reader that the two percentages given are directly comparable, and thus paints a somewhat rosier picture of the efficacy of the Pasteur treatment than is warranted by the facts. But these and similar statements in general represent "the truth" even though they fall short of being "the whole truth," and probably detract little from the value of the book.

Because of its nature, the work is not likely to be valuable as a source of information to the veterinarian, but he may wish to recommend it to clients who are looking for a popular, yet accurate presentation of the subject.

You may obtain any book reviewed in this department by remitting the published price to the Book Department of VETERINARY MEDICINE, 7632 S. Crandon Ave., Chicago, Ill. Bulletins and circulars may be obtained free direct from the State Experiment Station issuing them. Government bulletins from the Superintendent of Documents, Washington, D. C.

Useful Bulletins

Feeding and Management of Market Hogs. *J. M. Fargo, G. Bohstedt, and J. J. Lacey.* Bul. No. 454, U. of Wisconsin Agr. Exp. Sta., Madison, 22 pp., 4 figs.

The Potassium Requirement of Growing Pigs. *E. H. Hughes and N. R. Ittner.* Reprint from *Jnl. Agr. Res.* 4 pp., 1 fig. Superintendent of Documents, Washington, D. C. Price 5c.

Preservation of Meats and Poultry in Frozen Lockers. Michigan State College, East Lansing, Bul. No. 223.